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ON THE ALLEGED ACTION OF THE OBLIQUE
MUSCLES IN OBLIQUE ASTIGMATISM.¹

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DURING the past seven years Dr. Savage has talked and written a great deal on the action of the oblique muscles in oblique astigmatism,² trying to convince us "that a revolution of the eyes on their antero-posterior axes, for the improvement of vision, occurs in all cases of oblique astigmatism." Unfortunately, however, his papers furnish no evidence for the actuality of this rotation, beyond the mere statement that he has often observed it.

But in this skeptical age such unsupported assertions are not sufficient to establish a scientific fact. We want to know by what methods of observation, by what tests or experiments a writer has been led to his conclusions, so that we may test his methods in suitable cases and judge for ourselves whether his observations are correct and his conclusions well founded.

¹Read before the Chicago Society of Ophthalmology and Otology, January 15, 1895.

²The term "oblique astigmatism" is an acceptable abbreviation for designating astigmatism in which the principal meridians do not coincide with the vertical and horizontal meridians of the cornea.

That Dr. Savage has deemed it unnecessary to furnish us the data by which we could verify his observations is to be regretted, the more so because the theories by which at different times he has endeavored to explain the necessity of this action of the oblique muscles in oblique astigmatism, leave us very much in doubt as to whether and what kind of rotations Dr. Savage has really seen at different times. In 1887 he explained the rotation by the "harmonious, non-symmetrical action of the oblique muscles." The superior oblique of the one eye and the inferior oblique of the other were supposed to act in association to "so rotate the eye on its antero-posterior axis as to bring its best meridian vertical or horizontal."³ But in 1891 he speaks of the "harmonious symmetric action of the oblique muscles;"⁴ the alleged rotations are supposed to be brought about by the associated action of both superior obliques or both inferior obliques.

Now, if both superior obliques act together the upper ends of the vertical meridians of both eyes are rotated toward each other, and by the simultaneous action of both inferior obliques they are turned away from each other, while by the associated action of the superior oblique of one eye and the inferior oblique of the other, both vertical meridians are turned in the same direction (either both to the right or both to the left). It is therefore evident that according to Dr. Savage oblique astigmatism in 1887 made the eyeballs rotate in the *same* direction, but in 1891 in *opposite* directions; but why should the same physical cause (oblique astigmatism) produce such opposite effects at different times? It does not seem possible that Dr. Savage has actually seen these different rotations and it seems more probable that they have been suggested to him by the different views he entertained in 1887 and 1891 in regard to what was to be attained by the revolving of the eyeballs. In 1887 Dr. Savage was of the opinion that astigmatism "is least troublesome to a patient if the best meridian is vertical, as in hypermetropic astigmatism, or horizontal, as in myopic astigmatism," and that it is the function of the oblique muscles to so rotate the eye on its antero-posterior

³The functions of the oblique muscles in certain cases of oblique astigmatism. *Journal of the American Med. Association*, Nov. 5, 1887.

⁴*New Truths in Ophthalmology*, Chapter 2.

diameter as to bring its best meridian to the vertical or to the horizontal," and this he said is accomplished by the non-symmetrical action of the oblique muscles.⁵

But in 1891 he had conceived the idea that the oblique muscles had to rotate the eyes so as to bring the images of a horizontal object upon corresponding retinal meridians, and this change of opinion made necessary a change in the revolution of the eyeballs and suggested the symmetric action of the oblique muscles.

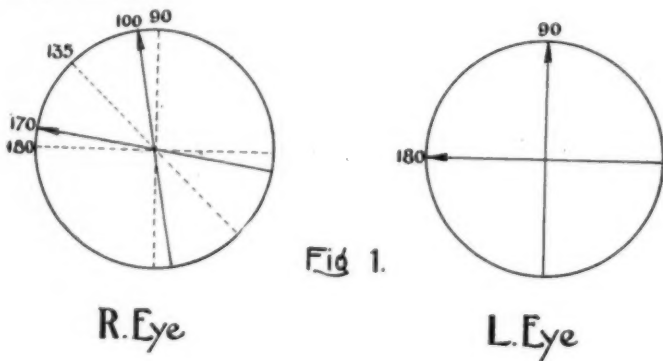


Fig 1.

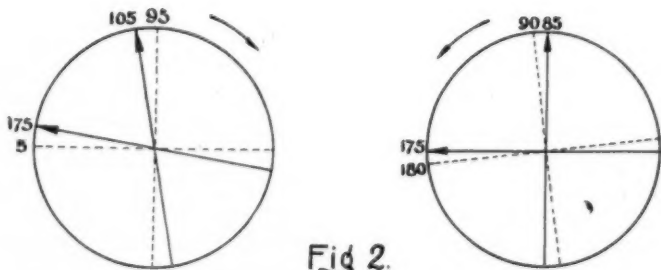


Fig 2.

Has this second theory of Dr. Savage any better foundation than his first one? His explanation is as follows:

"In oblique astigmatism, be the obliquity much or little, it is a physical impossibility for the horizontal object and its

⁵ Dr. Savage admitted later that "at that time the condition necessitating this revolving of the eyes was not clear to me;" and I am sure that every one who has read that paper fully agrees with him on this point.

retinal image to occupy the same plane. The same is true of all objects not in a plane with one or the other of the two principal meridians. There is, therefore, not only blurring but also obliquity of the image." "The retinal image is displaced toward the meridian of greatest curvature." "Let Fig. 1 represent a pair of eyes with hypermetropic astigmatism; in the left eye the strongest meridian is vertical, and a horizontal arrow throws its image upon the horizontal meridian of the retina. In the right eye the strongest meridian is at 135° , hence the image of the same arrow is deflected toward this meridian and falls upon the retinal meridian 170° instead of 180° . As the two images do not fall upon corresponding parts of the retina, there is double vision, which is overcome by the harmonious action of the superior oblique muscles. The superior oblique of the right eye revolves it so as to bring meridian 175° of the retina in position to receive the impress of the oblique image (see Fig. 2), while at the same moment the superior oblique of the left eye has so revolved it as to bring meridian 175° to the horizontal, hence in position to receive the horizontal image. The oblique and horizontal images being now on harmonizing portions of the retina, there is no double vision."⁶

This sounds all very plausible, but unfortunately for Dr. Savage's theory, the objects in nature are not all horizontal arrows, but present also vertical and oblique outlines, and it has already been shown by other critics (Dr. H. Wilson⁷ and Dr. F. B. Eaton⁸) that the supposed rotation which would bring the retinal images of a *horizontal* arrow upon corresponding meridians of the retina, would at the same time make the retinal images of a *vertical* arrow harmonize less than before the rotation. In the left eye of Figs. 1 and 2 the image of the vertical arrow would be on the vertical meridian

⁶But this is not quite correct, for when the left eye is rotated 5 degrees its astigmatism has become oblique and according to Dr. Savage's own doctrine the image of the horizontal arrow could no longer be horizontal, hence would not be received on the meridian 175° when this meridian has been turned to the horizontal.

⁷*Archives of Ophthalmology*, XXIII.

⁸*Transactions of the Section of Ophthalmology*, meeting at San Francisco, 1894.

of the retina before and on the meridian 85 after the rotation, but in the right eye the image of the same arrow (displaced 10° toward the strongest meridian according to Dr. Savage's doctrine) would be on meridian 100 before and on 105 after the rotation; hence the vertical images would be separated more than before the rotation.

It does not seem likely that the eyes execute rotations which are so obviously useless, and a little further investigation will show that there is no necessity for them and that the obliquity of the retinal images which is supposed to make these rotations necessary, is not real but imaginary. Dr. Savage thinks the obliquity of the image in oblique astigmatism is demonstrated by the following experiment:

"One who is emmetropic, or at least nonastigmatic, by placing a — 3 D. cyl. before each eye in trial frame, creates three diopters of hypermetropic astigmatism. The axis of the left cylinder being at 90° and that of the right eye at 135° he has made of his own eyes the kind represented by Fig. 2 (our Fig. 1.) He may now for a moment place the opaque disk in front of his right eye, at the same time placing the double prism (each 6°) before the left eye. A horizontal arrow, head to the left, having been drawn on a cardboard, he looks through his double prism and sees two horizontal, hence parallel, arrows. On removing the opaque disk from the right side of the trial frame, a third arrow appears between the other two, but not parallel with them—it is oblique down and to the patient's left."

I have given the exact copy of the doctor's own description. The reader, therefore, may form his own opinion as to whether this experiment sustains the view that oblique astigmatism causes an obliquity of the images of horizontal objects. In my opinion it does not; to me the whole experiment is only a roundabout demonstration of the well-known fact that horizontal (or vertical) lines viewed through a concave cylinder held with its axis obliquely before the eye, appear inclined toward the axis of the cylinder. But this apparent deflection of the lines from the horizontal (or vertical) direction rapidly decreases when the cylinder approaches

⁹ *New Truths in Ophthalmology*, p. 12.

the eye and it disappears entirely when the cylinder, instead of being placed in a trial frame, is brought in the closest proximity possible to the cornea; which shows that Dr. Savage's own experiment proves the *absence* of obliquity of the retinal images in oblique astigmatism, if only we take the necessary precaution to imitate as closely as possible the optical conditions of the natural astigmatic eye.

But I believe the following demonstration must convince everybody that oblique astigmatism does not alter the position of the images on the retina, but that the retinal image of a horizontal line remains horizontal and that of a vertical line vertical. In the front of this glass case which I use for demonstrations in lectures on refraction, I have put a spherocylindric lens ($+10 \text{ } \bigcirc + 2c$) which can be rotated in its setting so as to place the axis at any desired angle. Inside of the case we have a diaphragm (representing the pupil) to cut off the very peripheral rays and a piece of ground glass (representing the retina) which can be moved back and forth to change its distance from the lens as we please. Several feet in front of this refraction box I put a metal screen having a very narrow horizontal slit one inch long, which is well illuminated by a light behind the screen. This slit being exactly opposite the horizontal diameter of the spherocylindric lens sends its rays through the lens to the ground glass screen in the box; if this screen is now placed about 4 inches from the lens it is in the posterior focal plane and if the axis of our spherocylinder is vertical we see upon the screen a bright luminous horizontal line. Now, if I turn the axis of the cylinder 5 degrees to the left (to 95°), the image on the screen is still horizontal but has assumed a long rhomboid figure, its upper and lower line being exactly horizontal, its short sides slanting 5° upwards to the right. If I continue rotating the axis in the same direction you notice the sides of the luminous image become longer and more slanting, while top and bottom become proportionately shorter, but remain horizontal. When the axis of the cylinder arrives at 135° the figure is a regular rhombus, its sides slanting exactly 45° , and while the axis is traveling from 135° to 180° the sides grow longer than the top and bottom and gradually turn toward

the perpendicular direction; and when the axis arrives at 180° the image on the screen is a rectangle with well defined sides, but top and bottom blurred. You notice the slanting of the sides of the luminous figure corresponds always exactly with the obliquity of the meridian of greatest refraction, for which the screen is not adjusted¹⁰; but if we slide the screen a little forward to bring it in the focal plane of the strongest meridian and repeat the rotation of the cylinder axis, you will observe again the same change of the luminous image from a line to a rhombus and finally a rectangle; but you will see now the slanting of the sides follows exactly the axis of the cylinder. But whether the screen stands in the anterior or posterior focal plane you will observe that during all the revolution of the cylinder axis the transverse lines (top and bottom), which of course indicate the position of the image of the horizontal slit, never depart from the horizontal direction.

And if we turn the screen so as to make the slit a vertical line we can in the same manner convince ourselves that during all the changes the luminous image undergoes through the rotation of the cylinder from 180° to 90° and back, the sides of the image, which of course determine the position of the image of a vertical object, never depart from the vertical direction. Hence neither the image of a horizontal nor that of a vertical line shows during the rotation of the cylinder any obliquity in the sense of Dr. Savage's theory.

Nor do clinical tests sustain this theory. In a number of patients with oblique astigmatism I have tried the double prism test, following exactly Dr. Savage's directions as quoted above, but not one single patient could observe any obliquity of the middle line. The following case of mixed astigmatism seemed particularly favorable for the experiment. The R. E. had myopia 2.50 in meridian 115, and hypermetropia in meridian 25; the L. E. had M. 1.50 in meridian 65 and H. 5 in meridian 155. With correcting glasses $V = \frac{20}{20}$, and the patient, a very intelligent woman and good observer, noticed quickly the slanting of the floor and the other visual distor-

¹⁰It is obvious that the widening of the luminous figure is caused by the diffusion circles of the non-focussed rays.

tions so commonly produced by correcting cylinders with oblique axis. But tested¹¹ with the double prism she failed to notice any obliquity of the middle line; all three lines appeared perfectly parallel. And why should we expect a different result? Why should in oblique astigmatism a horizontal line not form a horizontal image on the retina? The refraction of the eye affects only the sharpness of the retinal image, but not its location. The location on the retina of the image of a luminous point is determined by what Helmholtz called the direction ray (*Richtungstrahl*) which forms a straight line drawn from the object point through the nodal point of the eye to the retina; where this direction ray touches the retina there the image of its object point is formed. If the object looked at is a horizontal line the direction rays connecting all its luminous points with the nodal point pass through the horizontal meridian of the cornea, and as this meridian has a regular curvature in oblique astigmatism, these rays proceed undeflected in their horizontal plane through the nodal point to the retina and form upon the latter a horizontal line.

It is therefore evident that neither experiments nor clinical observations nor the laws of physiological optics sustain the doctrine of the obliquity of the retinal images and the necessity of any action of the oblique muscles in oblique astigmatism. The theory rests on false premises and is wholly untenable.

¹¹ Of course without the correcting lenses.

THE LAWS OF PARALLEL OCULAR MOTION AND
THEIR MISSTATEMENT IN TREATISES
AND TEXT-BOOKS.

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A SERIOUS discrepancy exists between the laws of parallel ocular motion as formulated by Listing and Helmholtz, and their statement and interpretation by the authors of nearly every treatise and text-book wherein they are described. I propose to demonstrate that in consequence the descriptions given in these works of certain parallel movements of the eyes are incorrect as regards the position of the vertical meridian of the retina, and hence of the whole retina and eyeball. Further, that this in turn has led to erroneous statements as to the role played by the various muscles in the production of these movements. Finally, I propose to show that these misconceptions must lead to errors of diagnosis of certain pareses, paralyses and abnormal muscular tensions (heterophorias).

Since spectral or after-images follow the movements of the eye with absolute exactness, they are especially adapted for the detection of movements such as torsions or rotations on the visual axis, not otherwise appreciable. The experiments of Donders with the spectral image of a vertically suspended colored thread are the ones most often detailed in text-books.¹ Following, however, Le Conte, who has given the clearest and best methods of experimenting with spectral images,²

¹ Alfred Gräefel's *Klinische Analyse der Motilitätsstörungen des Auges.*"

² *Sight*, p. 164, 165, *et. seq.*

we find that gazing in a darkened room at a rectangular cross-slit in the window until branded upon the vertical and horizontal meridians of the retina and throwing the spectral image thus formed, by moving the eyes only, into the corners of a vertical wall, it is distorted as seen in Fig. 1.

In order to measure the *amount* of torsion, Le Conte covered his experimental plane (wall) with rectangular co-ordinates, vertical and horizontal, and by experiment found, for extreme oblique positions, the torsion of the vertical arm of the spectral cross on the vertical lines of the experimental

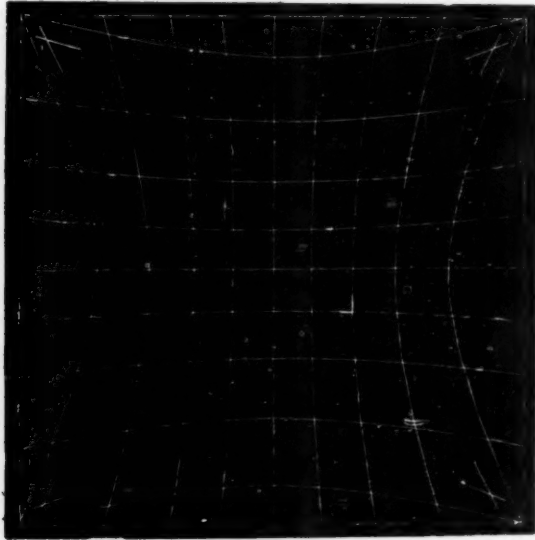


FIG. 1.

Diagram showing the inclination of vertical and horizontal images on a vertical plane for all positions of the line of sight. [Le Conte.]

plane to be about 15° , but the torsion of the horizontal arm on the horizontal lines only 5° . Putting his results together he produced the diagram Fig. 1, which gives the position of the vertical and horizontal arms when projected on a vertical plane for all positions of the line of sight. In order to eliminate the errors of projection on a vertical plane surface, he next used the sky as the plane upon which to project the

spectral images, it being everywhere at right angles to the line of sight, and constructed the diagram shown in Fig. 2, which represents the torsion of the undistorted spectral cross when projected upon a spherical concave surface for every position of the visual line, since the cross formed by every intersection of the lines represents the position of the spectral image when the gaze is directed to that point.

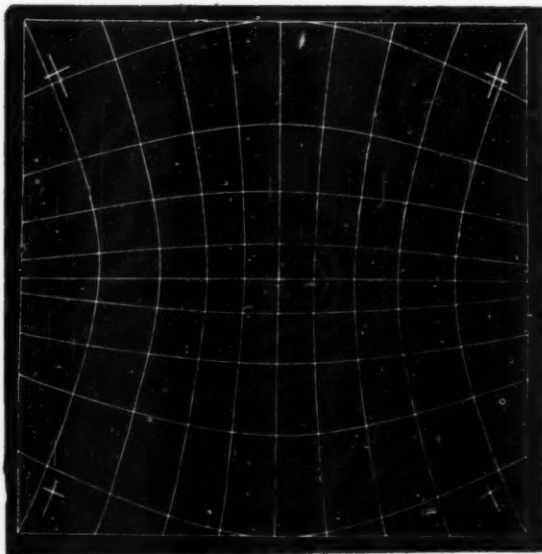


FIG. 2.

Diagram showing the inclination of the undistorted spectral cross when projected on a spherical concave surface, for every position of the line of sight. [Le Conte.]

In both Figs. 1 and 2 the torsion of the vertical arm of the cross conforms to the positions given it by Donders, and since the spectral image exactly follows the motion of the eye, he assumed (incorrectly, as we shall see), that the vertical meridian of the retina inclines similarly with regard to the median plane of the head; hence he formulated the following laws:³

³ Alfred Gräfe's *Klinische Analyse der Motilitätsstörungen des Auges.*"

1. In looking in the horizontal plane, straightforwards, to the right or left, the vertical meridian suffers no inclination, but remains vertical.

2. In looking in the vertical meridian-plane, straight forwards, upwards or downwards, the vertical meridian also remains vertical.

3. In looking diagonally upwards to the left, the vertical meridians of both eyes are inclined to the left and parallel (that of the left eye slanting outward, that of the right inward.)

4. In looking diagonally downwards to the left, the vertical meridians of both eyes are inclined to the right and parallel (that of the left eye inwards, that of the right outwards.)

5. In looking diagonally upwards to the right, the vertical meridians of both eyes are inclined to the right and parallel (that of the right eye outwards, that of the left inwards.)

6. In looking diagonally downwards to the right, the vertical meridians of both eyes are inclined to the left and parallel (that of the right eye inwards, that of the left outwards.)

Not only is it natural to infer that in the four diagonal positions the vertical meridian is inclined in the same direction as its projected spectral image, but such an inference is apparently unavoidable. Accordingly nearly every treatise and text-book of ophthalmology has recognized Donder's laws as correct, either directly by quotation, or indirectly in describing the position of the vertical meridian in paralyses; among these are the works of Soelberg Wells, Schmidt-Rimpler, Meyer, Macnamara, De Wecker, Stellwag, Carter and others.⁴ It appears, therefore, that these laws are not only accepted by ophthalmologists generally, but are applied clinically as guides in the diagnosis of muscular anomalies.

Nevertheless, if we turn our attention from the spectral image to the eye itself, a few very simple experiments will show that in all diagonal positions the direction in which the

⁴Panas in his "Traite des Maladies des Yeux," 1894, the last authoritative work on the eye, makes the same error. See vol. II, page 9. "It is to these inclinations that Helmholtz has given the name *wheel movements*. He distinguishes them as *positive* and *negative*, according as the inclination is in the direction of the movement of the hands of a watch with its face toward the observer, that is, from left to right, or the contrary. * * * In binocular vision *upward* and to the *right*, and *downward* toward the *left*, the movements are *positive*, while they become *negative* in the opposite position."

vertical meridian inclines with regard to the median plane of the head is exactly opposite to that of its spectral image. If we take a hollow rubber ball, or an apple, and thrust a steel knitting-needle vertically through the side nearest us to repre-

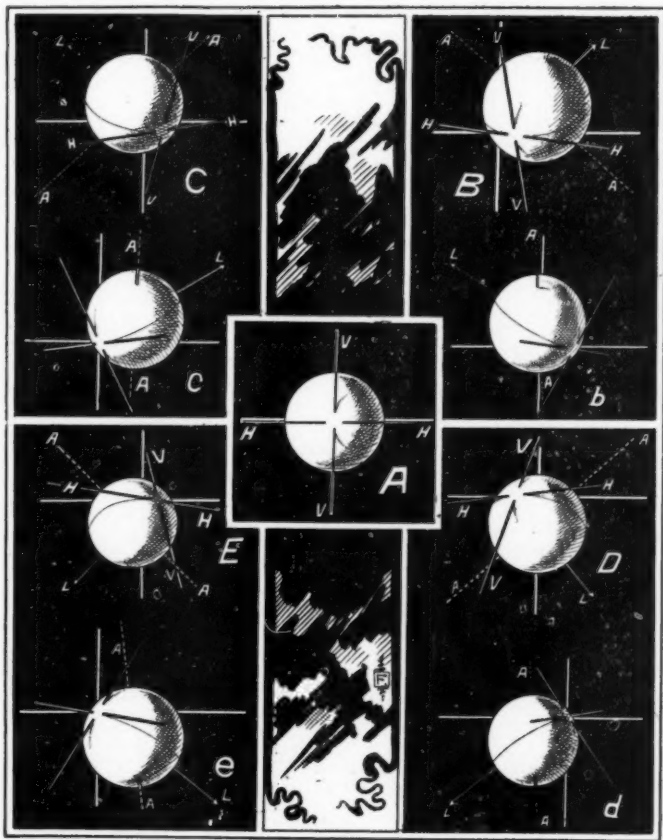


FIG. 3.

Rubber ball showing position of vertical and horizontal meridians of retina viewed from behind when looking: B, up to right; C, up to left; D, down to right; E, down to left. A, primary position; b, is B viewed from left side; c, is C viewed from right side; d, is D viewed from left side, and e is E viewed from right side. In each cut A-A is axis of rotation; V-V, vertical meridian; H-H, horizontal meridian; L, visual line. The unlettered vertical and horizontal white lines in each cut are on the background. (In each position the ball has been rotated slightly more than 45° . When rotated exactly 45° the horizontal meridian H-H is still horizontal.)

(From photographs by author.)

sent the vertical meridian of the retina, and another horizontally through its center from before backwards to represent the visual line, their intersection will represent the yellow spot with the eye in the primary position (see Fig. 3, A.) It is clear that from this primary position the visual line can be directed to a point diagonally upward to the right (say 45° to the right and 45° upward), in three different ways. *First.* By rotating the ball on its vertical axis 45° to the right, and then 45° backwards on its now obliquely placed transverse axis. When this is done (the ball held on a level with the eyes), we find that the vertical meridian (needle) is inclined backward, *to the left* (Fig. 3, B, V—V) with regard to a vertical line on the wall in front, and not to the right, as stated by Donders. *Second.* By rotating the ball on some axis which will cause the visual line to move diagonally upward to the right in a straight line. A little experimenting soon proves that the only axis on which this can be accomplished is one represented by a needle thrust through the center of the ball diagonally downward from left to right, perpendicular to the visual line and at an angle of 45° with the vertical meridian; in other words, an axis perpendicular to a straight line joining the first and second positions of the visual line (points of fixation.) (See dotted line A—A, Fig. 3, B). Rotating the ball backward on this axis, we find that the visual line (needle) moves diagonally upward to the right in a straight line, and that the vertical meridian is inclined backward *to the left* into precisely the same position as when the ball was rotated to the right and then upward. It is to be especially noted that in neither case there is any rotation on the visual axis. *Third.* By rotating the ball backward on its transverse axis 45° , and then 45° to the right on its now backwardly inclined vertical axis. Carrying out these movements we find that while the visual line is directed correctly, the vertical meridian, though inclined backward as before, remains parallel to a vertical line on the wall in front. To give it the same position as in the first and second instances, we must rotate the ball *on the visual axis to the left*; it then for the third time has the position shown in Fig. 3, B; otherwise, in the case of the eye itself, the retina would not

correctly perceive objects, since the vertical meridian would be inclined to the right relative to a really vertical object straight in front of it in the new position. As to the three remaining diagonal positions, each can be attained in the three ways just described, the resulting inclination of the vertical meridian in each instance being as portrayed in Fig. 3, C, D and E, and opposite in direction to those given by Donders and the text-books. Moreover, it makes no difference by which of these three ways the diagonal position is reached, the inclination of the vertical meridian will be the same, for: "Each position of the visual axis has its own invariable angle of torsion—a value independent of the manner in which the visual line is carried to that position." (Helmholtz.)⁵

Now, the law which covers all the phenomena I have described, and is accepted by physiologists, is that of Listing:

*"When the visual line passes from the primary position to any other position, the angle of torsion of the eye in its second position is the same as if the eye had come to this second position by turning about a fixed axis perpendicular both to the first and second position of the visual line."*⁶

Thus, in looking straight upward the visual line moves vertically, and the only axis perpendicular to this course is the transverse horizontal axis of the eye, the vertical meridian remaining vertical; in looking horizontally to the right or left the only axis perpendicular to this course is the vertical axis of the eye. Again, if the visual line be carried from the primary position upward to the left to a point on a straight line, which makes an angle of 10° with the vertical, the inclination (torsion) of the vertical meridian of the retina to the right will be the same as if the eye came to this *secondary* position by rotating on a fixed axis passing through the center of rotation of the eye downward to the left at an angle of 10° with the horizontal. In fact, the eye would rotate on such an axis instead of one making an angle of 45° , as in C, Fig. 3, and so on for every point to which the visual line is carried from the primary position.

⁵ *Physiologie Optik*, French Ed. 1867, p. 602.

⁶ *Ibid.* p. 606.

But as we have seen, torsion (rotation) *on the visual axis* occurs whenever, with the visual line elevated or depressed, it is carried to the right or left; hence Helmholtz formulated the following laws, which, however, are contained in and deduced from Listing's law:

"When the plane of sight is directed upward, lateral displacements to the *right* make the eye turn to the *left* (Fig. 3, *B*), and displacements to the *left* make it turn to the *right* (Fig. 3, *C*).

When the plane of sight is depressed, lateral displacements to the *right* are accompanied with torsion to the *right* (Fig. 3, *D*) and those to the *left* with torsion to the *left*." ⁷ (Fig. 3, *E*).

But it may be asked: What proof is there that the vertical meridian does not incline in the same direction, as its spectral image is plainly seen to do when thrown diagonally upward or downward upon a concave surface, as in Fig. 2? Because the inclination of the spectral image is *apparent*, not real, the cross being *referred to a new vertical meridian of space*. This is readily illustrated by holding the ball on a level with the eyes and in the primary position (Fig. 3, *A*) and rotating it backward on the oblique axis A—A (Fig. 3, *B*). During this movement the cross V—V, H—H, *apparently* rotates to the *right*, though on referring the vertical meridian V—V to a vertical line on the wall in front we correct this impression and perceive that its *real* inclination is to the *left*. Fixing the ball in this position (Fig. 3, *B*) and regarding it from its left side (Fig. 3, *b*), though we know it has not moved, the cross appears rotated far to the right, especially when referred to a vertical line on the right-hand wall of the room. What was *front and rear* in the position shown in Fig. 3, *B*, has become *left and right* respectively in the position shown in Fig. 3, *b*. It is the same for the other diagonal positions; in Fig. 3, *c* is *C* viewed from its right side; *d* is *D* viewed from its left side, and *e* is *E* viewed from its right side.

The four crosses in *b*, *c*, *d* and *e* representing the apparent torsion and corresponding in inclination to the four corner crosses in Fig. 2, each of which is the spectral image of the vertical and horizontal meridians of the retina when the vertical meridian is inclined in the *opposite* direction relative to

⁷ Ibid, p. 602.

the median plane of the head; *i. e.*, as in *B, C, D* and *E* respectively. Indeed, since a spectral image accurately follows the movements of the branded meridian, and when thrown upon a concave spherical surface is its true projection, the apparent inclination of the vertical meridian in a given position of the visual line necessarily determines an apparent inclination of its spectral image. If this be still doubted, the following experiment, which I have repeatedly verified, will, I believe, prove convincing: In a perfectly darkened room excite a spectral image by gazing at a vertical incandescent lamp, one-half of the filament being covered by a card. Put out the light and turn around a number of times until all knowledge of the position of the walls of the room is lost; then move the eyes while open into the four diagonal positions. The spectral image in each position inclines as in Fig. 2. Now, since the image is a strictly subjective one, its inclination must be due, in the absence of a surface of projection, to mental impression alone, and therefore to the estimate of direction and position resulting from the consciousness of the voluntary innervation of certain muscles and the consequent movement of the eyes.

But the error of the text-books does not end with false teaching of the movements and positions of the eye, for the necessary result of this is equally false doctrine concerning the combined action and relative tensions of the various muscles which produce these movements. As an illustration, I quote from the treatise of Soelberg Wells concerning the diagonal upward and outward movement of the eyes, which is described in a similar way in the other text-books:

"In moving the eye diagonally upwards and outwards, the vertical meridian being inclined outwards, the superior rectus acts in conjunction with the external rectus. But as the latter has no influence on the position of the vertical meridian, and as the superior rectus turns it inwards, we must call into requisition some other muscle which shall not only counterbalance the effect of the superior rectus upon the vertical meridian, but shall even more than correct it, and incline the latter outwards. The inferior oblique will be able to do this, for the eye is now in the position (upwards and outwards) in which the inferior oblique acts most upon the vertical meridian."⁸

⁸A Treatise on the Diseases of the Eye, third Amer. Ed, p. 670.

We have seen that in this upward movement to the right the vertical meridians are inclined to the *left*; neither is it correct to state as in the quotation that the external rectus "has no influence on the position of the vertical meridian," for:

"If the visual line be first raised by the combined action of the superior rectus and of the regulating inferior oblique, and the internal rectus be innervated, it no longer acts in a horizontal direction only. Its point of insertion is also elevated and its belly forms a different angle with the visual line. Its tension must therefore cause a further elevation of the inner; *i. e.*, a sinking of the outer half of the horizontal retinal meridian, and with it a rotation around the visual line." (Hering).⁹

It is obvious that the innervation of the external rectus must, with an elevated visual line, similarly incline the meridian to the left. Not only this, it can be proved that such torsional effect of the lateral recti is necessary in oblique movements to preserve parallelism of the vertical meridians and a correct position of the retinae. To make this clear and to establish a measure of relative muscular torsion, I ask attention to the following simple demonstration: Since in the primary position the planes of the superior and inferior recti make an angle of 23° with the visual line, their *torsional* angle is 23° and their *traction* (elevating and depressing) angle is $90^\circ - 23^\circ = 67^\circ$. In the same position the planes of the obliques make an angle of 55° with the visual axis; their torsional angle is therefore 55° and their traction angle $90^\circ - 55^\circ = 35^\circ$. Now, in moving the eye from the primary position vertically upward, the inward torsion of the superior rectus is neutralized by the outward torsion of the inferior oblique and the vertical meridian remains vertical. It therefore requires $\frac{5}{2.39} = 2.39^\circ$ of torsion of the inferior oblique to neutralize 1° of torsion of the superior rectus. This ratio of 1:2.39, I term the *relative torsion-angle*, and each degree of torsional traction of the superior rectus a *torsion angle*. To show its application, let us suppose that a position upward to the right be accomplished by rotating both eyes horizontally 23° to the right and then 20° vertically upward. That the

⁹ *Die Lehre vom binocularen Sehen. Leipzig, 1868.*

vertical meridian of the *right eye*, in accordance with Listing's law shall assume the position shown in Fig. 3, *B*, during the upward movement there must be no rotation on the visual line (torsion). But in this position, 23° to the right, while the plane of the inferior oblique makes an angle of $55+23=78^\circ$ with the visual axis, the plane of the superior rectus now coincides with this axis; hence it has no torsional effect. $78 \div 2.39 = 32.6$ *torsion angles* exerted by the inferior oblique, which is the amount of torsion to be furnished by the external rectus to neutralize the torsion of the oblique.

In the *left eye*, rotated also 23° to the right, the plane of the superior rectus now makes an angle of $23+23=46^\circ$ with the visual axis= 46 torsion-angles, while the plane of the inferior oblique makes an angle of $55-23=32$. $32 \div 2.39 = 13.6$ torsion-angles, and this deducted from the 46 torsion-angles of the superior rectus (since the torsion is opposite) gives 32.6 *torsion angles*, to be furnished by the internal rectus to neutralize the inward torsion of the superior rectus, *precisely the same amount called for in the case of the external rectus*.

If the same position be attained by a rotation first upward on the transverse axes and then by a rotation to the right on the now backwardly inclined vertical axes, the internus and externus must again be the means of producing the necessary inclination to the left of the vertical meridians; in this case, however, producing torsion on the visual axis, all the muscles finally having the same relative tensions as in the first instance.

Finally, if the position be attained by a diagonal movement in a straight line, the relative innervation and traction of the three muscles of each eye will again be the same, and the resulting axes of rotation, agreeable to Listing's law, will be perpendicular to the diagonal movement (*A—A*, Fig. 3, *B*).

That misconceptions of the true position of the retina and of the physiological action of the muscles may lead to errors of diagnosis of certain pareses and paralyzes, seems more than probable when we find that authors assign to the vertical meridians in paralyzes positions in accordance with their erroneous conceptions of the physiological action of the mus-

cles. The following description by Stellwag of the position of the vertical meridian in diagonal movements in paralysis of the externus is representative of that given in other treatises:

" * * * In diagonal directions of the glance towards the side of the paralyzed muscle, a false inclination of the meridian then occurs. * * * If the glance is turned downwards and towards the side of the paralyzed muscle, the axis of rotation of the affected eye lies more horizontally than that of the healthy eye; while the vertical longitudinal median section of the latter inclines very far outwards, the longitudinal median section of the paralytic eye is inclined but a little inwards, and the double images must correspondingly converge upwards, on account of their being homonymous."¹⁰

According to the above, if, in a case of paralysis of the right externus, the glance is turned downward to the right, the vertical meridian of the left healthy eye (which is in the longitudinal median section) "inclines far outward," *i. e.*, to the left; whereas, by referring to Fig. 3, *D*, we see that really it inclines *inward to the right*, and that paralysis of the right externus would cause the right eye to rotate on an axis which lies more horizontally than that of the left, the result being that the vertical meridian of the right eye would be nearly perpendicular and converge *upward* with that of the left, not being inclined so far to the right. The images would therefore *diverge* upwards. These inclinations of the false image are not always present, even in apparently uncomplicated paralysis of the externus, and this seemingly because of compensatory spasmodic action of the superior and inferior recti, which action is generally made evident some weeks after the onset of the paralysis by one image appearing to the patient to be nearer than the other, an illusion due to a difference in level of the images and the introduction thereby of apparent perspective.¹¹ Such compensatory action in ocular paralysis has long been recognized.

¹⁰Treatise on Diseases of the Eye. Fourth Amer. Ed., p. 845.

¹¹The following notes of a case of paralysis of the right externus have kindly been communicated to me by Dr. Alex. Duane, of New York:

"V. J. Female (colored), 45 years of age, came to Vanderbilt clinic on February 5. Stated that in the beginning of January she was

In conducting the examination of a case of ocular paralysis, it is often advisable to preserve the ideal horizontal visual plane, the sound eye first fixing the object while in the primary position; then, in order to bring into action one or more muscles, instead of moving the object the head is inclined on its horizontal or vertical axis. Only in this way, in certain cases, can the true inclinations and relative positions of the images be ascertained.

The bearing of the laws of ocular motion upon the diagnosis of heterophoria is as important, though less evidently so, as upon the diagnosis of paralyzes. In his late able paper, "Paralysis of the Superior Rectus and Its Bearing on the

attacked with severe headache and was delirious, and that four days later diplopia developed. In a few days headaches grew less severe and then ceased. Diplopia has persisted ever since. The two images usually appear side by side, but latterly one has seemed to be back of the other. I examined patient on February 19th. Excursion of right eye limited outward (eye makes rather more than half its usual excursion, and abduction evidently difficult to maintain). Homonymous diplopia at all distances in looking straight forward and increasing rapidly as the object is carried to right. If object is carried from left to right diplopia does not begin to occur until the median line is reached. In the right half of the field of fixation, particularly above, there is a vertical diplopia, with the image corresponding to the right eye below. This varies considerably in amount from time to time, and while repeated examinations prove that the patient is always consistent as regards the character of the diplopia, she does not always agree as to the way it changes, sometimes averring that it diminishes as the eyes are carried toward the middle line, and also as they are carried down. This latter seems to be really the state of the case. *In all parts of the field the double images are said to be strictly parallel*, and this no matter what distance they are placed from the patient and whether tilted to one side or the other or tilted or not toward the patient. Nor does it make any difference whether they are projected or not, the answer was invariably the same; *i. e.*, that the images were parallel. The examinations were made in all parts of the field of fixation and especially in the extreme upper and right hand portion. I may add that the pupillary reactions were normal and the accommodation unaffected. V. $\frac{20}{20}$. H. of 1 D. or more. The vertical diplopia I cannot regard as paralytic; if it were it would indicate a paralysis of the left inferior oblique (if the vertical diplopia is admitted to have increased in looking up to the right), and the left eye seemed to be unaffected. I should rather, from its very changeable character, regard it as due to a spasmodic action of the right superior rectus, which would produce a diplopia in this sense and situation."

Theory of Muscular Insufficiency,"¹² Dr. Duane remarks: "I am convinced from a consideration of the symptoms which they present that many cases of hyperphoria which I examined before my attention was called to this subject (paralysis of the Sup. rectus, E.), and the necessity of testing for diplopia in all parts of the field of fixation, were really instances of this affection." He also contends that " * * * just as we may have a paralytic or spastic squint, we may have a paralytic or spastic heterophoria." It needs no argument then to prove that an intimate and correct knowledge of the position of the retinæ in all positions of the visual line in the field of fixation is a necessary foundation for the solution of the complex problems which often present themselves in cases of heterophoria. More than this: I have shown (*Ophthalm. Record*, March, 1895), that certain theories of so-called insufficiency and of compensatory action of the oblique muscles in oblique astigmatism are proved to be without foundation when we realize that torsion is largely, if not principally, the result of action of the lateral recti.

While the expositions and illustrations here given have, I trust, made clear the origin of the errors concerning the physiology of ocular movements found in treatises and textbooks, it is not so easy to account for their continued existence thirty years after the appearance of the classic work of Helmholtz and the writings of such accurate observers as Hering, Listing and A. Fick. The vitality of such errors certainly indicates that the training in physiology of neither the ophthalmologist of this or any other country is yet what it should be, and serves to emphasize the earnest admonition which the pupils of Agassiz tell us he gave them: To seek truth rather in the faithful study of Nature than within the covers of books.

¹²*Archiv. of Ophth.*, vol. XXIII., p. 61.

HYPERMETROPIA OF HIGH DEGREE, WITH A
STUDY OF CASES.BY M. W. ZIMMERMAN, M. D.,
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ABSOLUTE Emmetropia is rare, and the normal refraction of the human eye is probably hypermetropic; certainly this is throughout life the most common optical error. Under normal conditions the eye, which at birth is hypermetropic to a considerable degree, shares in the growth of the individual and increases in size without notably disturbing the relations of its several axes. This growth is accompanied by a gradual decrease in the curvature of the crystalline lens. The ideal result of such development is a gradual decrease, and the final disappearance of the infantile hypermetropia. Often, however, the change is arrested before this condition is established, either because the error is excessive or the sclera too rigid to permit the necessary expansion. Less frequently, but especially in the presence of pathological thinning of the ocular coats, this distension of the globe continues and the eye passes into myopia, when it becomes subject to all the dangers incident to the latter state.

Hypermetropia, even when extreme, lacks much of the interest which rightfully attaches to myopia, and offers many points of difference. It is always congenital and shows little or no tendency to increase. There are no recognizable lesions peculiar to this condition except those of dimension; disease of the retina and choroid being extremely rare and coincidental. Concerning the acquired hypermetropia of later life, it is perhaps safe to consider this a pre-existing error becoming manifest through failure of the accommodation. Peculiarities of contour, particularly of the face, are by no means

constantly present. There exists a very manifest relation between hypermetropia and microphthalmus; both are results of an incomplete growth of the organ, and the terms simply indicate degrees of the defect; marked impairment of the retinal function offers perhaps the most rational basis for a proper division.

For the purpose of this paper I have selected cases in which both eyes were hypermetropic to the extent of 5 diopters or more in the higher meridian, all cases of aphakia and all those presenting opacities in the media being excluded. With a very few exceptions, all patients under 35 years of age were examined after complete paralysis of accommodation, usually secured by repeated instillation of solution of atropin, and even in middle life strong solution of homatropin was frequently used. Examination was by the ordinary subjective methods, verified by the ophthalmoscope and shadow test, illiterate and very young subjects being of course examined by objective methods alone.

Of 1789 refractions in hospital* and private practice, 58 cases, or 3.24%, met all the above conditions. The highest degrees occurred in two sisters. A., 6 years of age, R. E. 13 diopters, L. E. 12 diopters; and K., 4 years of age, R. E. 11 diopters, and L. E. 10 diopters. Altogether seven eyes presented errors of 10 diopters or more. In one patient 48 years of age, the defect amounted to 11 diopters in both eyes, showing that errors of high grade are by no means confined to the young. Astigmatism was present in both eyes in twenty-three cases and in one eye only in three additional, making a total of 49%, in all of which except three the axis was approximately vertical, the exceptions being cylinders of low degree. Astigmatism would seem to be distinctly less frequent in the high degrees of hypermetropia; only one instance occurred in an eye possessing a defect exceeding nine diopters.

Owing to illiteracy or extreme youth, no vision is recorded in 9 cases; of the remainder, 10 eyes possessed vision of $\frac{6}{6}$ and 9 others of $\frac{6}{60}$, making a total of 18.5% in

*I am indebted to Dr. A. D. Hall for access to the records of his clinic at Wills' Hospital during my term of service with him.

which visual acuity may be considered good. Vision of less than one-fourth of the normal existed in 7 eyes. With correcting glasses vision of $\frac{6}{6}$ was obtained in 36 eyes, and of $\frac{6}{9}$ or better in 63. + %. Where the error exceeded 6 or 7 diopters and when complicated by high degrees of astigmatism, the above result was not obtained. Simple reduced vision was the only subjective symptom in 36% of these cases, all others seeking relief from more or less violent asthenopia or reflex disturbances of the usual types. This latter group includes all the astigmatic cases, and with a few exceptions those in early life. No chorea, epilepsy, or other grave reflex phenomenon was noted. It does not appear that the symptoms differed materially in severity from those caused by defects of lower grade; of the histories furnishing satisfactory notes on this point only four gave evidence of unusual violence. In this connection it is of interest to know that 35 patients (28 being under the age of 25 years) had never worn glasses. In a very few instances very young patients brought small objects very close to the eye, preferring to ignore the circles of dispersion in order to secure larger images; such cases are almost invariably considered by family and friends to be "near-sighted."

A characteristic of the hypermetropic eye is its power of securing good vision by excessive action of the accommodation, which is made possible by hypertrophy of the ciliary muscle, mainly its circular fibers. In cases of high degree the demands upon this muscle are very great, and it is astonishing how long it can respond without complaint. Unfortunately complete records of the *total* accommodation cannot be given, but instances in which hypermetropia of 5 diopters was masked and apparently perfect vision at the ordinary reading distance obtained, are by no means rare. In one case 7.5 diopters was unsuspected during the exacting school years and first became manifest at the age of 15. Assuming that this patient selected a reading distance of 33 cm., he would have required 10.5 diopters of accommodation for this purpose. The presence of a very slight amount of astigmatism is sufficient to prevent this result from compensatory action of the ciliary muscle.

Hypermetropia is recognized as the most important factor in the production of convergent strabismus, being present in at least 85% of all such cases. Taking the totals as reported for five recent years at Wills' Hospital, in this city, convergent squint occurs in 8.9% of all hypermetropic patients; and admitting the errors inseparable from figures so obtained, this proportion is perhaps fairly accurate. In the group of high hypermetropia under discussion, there were sixteen cases of convergence, or 27.6%, indicating a much greater frequency than with low errors, although the contrary has been considered by most observers to be the case. There was no case of divergence. Concerning the supposed greater liability of the hypermetropic eye to glaucoma, these cases offer no testimony. Other complications, such as hordeoli and marginal blepharitis were present rather infrequently, the liability being probably that of ametropia in general.

It is impossible to ignore the influence of heredity in errors of refraction, but that hypermetropia of high degree is transmitted from one generation to another as is myopia of the same grade, seems improbable. I can present but few facts in support of this opinion, but it is of interest to note that my highest cases, the sisters previously mentioned, are the only children of parents having each but one diopter of hypermetropia. Very recently I have examined several members of another family. The father has a simple error of 1.5 diopter in both eyes and the mother a similar defect of 1.25 diopter. One daughter, aged 16, has an error in the R. E. of 5.25 and in the L. E. of 5.75 diopters; a son, aged 12, is wearing R. E. 6 and L. E. 6.50 diopters, both cases having moderate astigmatism. A third child wears strong "far-sighted" glasses which I have not seen, while the fourth and youngest child, who has just begun school, is presenting the characteristic symptoms of such a defect.

Concerning the treatment of this condition there can scarcely be two opinions. All such patients should be carefully refracted as early as possible and glasses given for constant wear. As a rule they accept glasses readily, but young subjects will rebel against immediate full correction, and in practice it is wiser to make a liberal reduction in the first

glasses; their strength can later be gradually increased without causing annoyance. Treatment of the complications need not be discussed here.

Without attaching undue importance to the evidence furnished by such a small group of cases, I wish to present briefly the following conclusions concerning hypermetropia of high degree:

1. It is always congenital and without tendency to increase. In children a decrease may be expected.
2. It presents no characteristic lesion of the choroid, retina, or media.
3. Astigmatism is present in about 50% of these cases, but decreases in frequency as the error becomes higher.
4. The severity of the asthenopia does not bear any close relation to the degree of the defect.
5. The principle complication is convergent strabismus, which is more frequent than with lower degrees of the error.
6. The influence of heredity is not clearly defined.
7. Early constant correction is indicated in all cases, and becomes imperative when strabismus is present as a complication.

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A NEW OPERATION FOR THE ADVANCEMENT
OF THE RECTI.BY CHALMER PRENTICE, M. D.,
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IN all advancement operations the tying of the ligature is a question of judgment, and at the best we can only approximate the change of position. By such operations we can never hope to obtain anything like a uniform accuracy in the change of the position of the eye, for the small difference of one *millimeter* may mean several degrees of deviation of the optic axes in one direction or the other. By my operation with the ligature plate there will be much greater accuracy in attaining the desired position of the eye.

The ligature plates are made of aluminum. They are about three *millimeters* in width, and vary in length from about four *millimeters* to twelve or more, and weigh from one-eighth to three-fourths of a grain. They are spherically curved so as to fit the contour of the eye, their curvatures being in varying diameters to meet the requirements of different sizes of eyes. The plate is slightly notched at each end, and has a groove running its entire length on the convex surface from one notch to the other, into which the ligature falls and is out of the way of producing any irritation. (Fig. 1.)

FIG. 1.
Ligature Plate.

An incision is made through the conjunctiva and Tenon's capsule in the direction of the muscle beginning at its scleral attachment and extending along the middle line as far as it may be necessary. The muscle should then be entirely freed from capsular and ocular attachments. A Steven's hook is then passed behind the muscle and traction made toward the cornea; another hook is now passed behind the muscle from its opposite side and traction made in the opposite direction at the same time. The

point of the second hook should be forced outside of the capsule so as to expose the muscle to view; a small curved needle carrying one end of a ligature is made to enter one margin of the muscle as far back from its scleral attachment as is necessary, and pass as nearly as possible transversely through its fibers and come out on the opposite margin of the muscle. This engages many more fibers of the muscle than the passing of the ligature directly through it. It also offers a much greater support to the ligature, there being much less likelihood of its tearing away; in fact, I have not known such an accident to occur in this operation. Each end of the ligature on its respective side is now passed from the under side through the margin of the muscle close to its scleral attachment. After the two ends of the ligature have been brought through these parts of the muscle the hooks are taken out. Each end of the ligature on its respective side is now brought through the conjunctiva from its under side at a point about four *milli-*

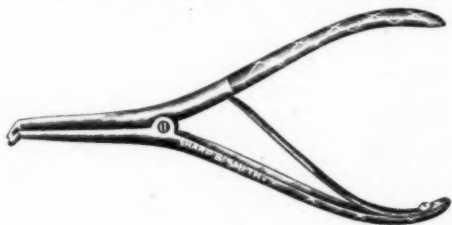


FIG. 2.
Ligature Dilator.

meters in the direction of the cornea from the scleral attachment of the muscle, the ends being about eight or ten *millimeters* apart, which the width of the scleral attachment should determine. The exits through the conjunctiva should be from three to four *millimeters* wider apart than the width of the scleral attachment. The two ends of the ligature should now be carefully tied by a surgeon's knot, not drawing the ligature so tight as to draw or pucker up very much the conjunctiva that it engages. Not much drawing forward of the muscle should be attempted in the first tying of the ligature; it should be tight enough to insure that all slack in the ligature is taken up. Or, where the conjunctival exits of the ligature were about eight *millimeters* apart, the tightening should be sufficient to draw them within four *millimeters* of each other. The knot should be very carefully and firmly tied. Two strabismus hooks may now be used or a ligature dilator made for the purpose, (Fig. 2) and traction in opposite directions can

be made, which now advances the muscle. The operator can now see about what length of a ligature plate should be used. The ligature plate is now firmly seized with a pair of forceps made for the purpose (Fig. 3) and one of its notched ends is made to engage one side of the ligature.* A somewhat strong Steven's strabismus hook is now used to make traction on the opposite side of the ligature, and to slip it over into the notch on the other end of the ligature plate. The forceps and hook are now removed and the ligature and knot fall into the groove on the ligature plate, so that there is no possibility of its coming in contact with the conjunctiva and giving rise to even that amount of irritation caused by an ordinary ligature.

An examination can now be made to ascertain the exact position of the eye and the amount of advancement that has been accomplished. If it is not sufficient, a ligature plate of greater length



FIG. 3.

Forceps for holding ligature plate.

can be made to supersede the first. If too much advancement has been made a shorter ligature plate can be used. The ligature plate, if of a proper shape and carefully made, never gives rise to the slightest irritation; its presence is not even felt by the wearer, and it should be left in for three or four days.

When the operation is made without cutting the tendon, the muscle is tucked or folded upon itself and the inflammatory action that follows fastens it in this position. The slight bunching or enlargement that results from the folding is soon entirely obliterated by absorption. After that stage of the operation where the ligature has been passed through the muscle the first time, a portion of the muscle can be cut away if it is deemed advisable. Unless the amount of advancement is very considerable, the operation will generally prove fully as satisfactory without cutting the muscle. By this operation I have changed the position of the eye 30° without cutting the muscle.

*These instruments are made by Messrs. Sharp & Smith, of Chicago.

Modifications of the above operation can be advantageously made in which this plate is still very useful. Where the conjunctiva is sufficiently strong to withstand the necessary traction, that stage of the operation where the ligatures are passed through the muscle at its scleral attachment may be left out, and after the ligature has been passed through the muscle far enough back, the two ends may be brought out through the conjunctiva on their respective sides, eight or ten *millimeters* apart, as close to the cornea as possible. If the conjunctiva is sufficiently strong to stand the dragging, the ligature plate prevents it from puckering up and offers the advantage of increasing or lessening the effect of our operation, at the same time hiding the ligature from any touch with the palpebral conjunctiva. In all the old operations, after the ligature has been tied, if the position of the eye is not satisfactory, any alteration involves a new ligature and another operation, whereas with the ligature plate these alterations can be made by substituting plates of different lengths.

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IS GLAUCOMA CURABLE WITHOUT OPERATION?

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PERHAPS no class of scientific inquirers have more need to lend an attentive ear to the trite monition "go slow" than ophthalmologists. They very naturally become enthusiasts, finding their greatest satisfaction not so much in the utilization of accepted facts and methods as in the investigation and development of new ones. And it is to this spirit of enthusiasm which inspires the *personnel* of our special branch of medicine that much of its progress is due. It is our vantage as well as danger ground, for enthusiasm, if not properly restricted and tempered, is likely to place its votary astride a "hobby." Once there, mere coincidences are liable to be exalted into facts and promulgated as such. From that infirmity some of the ablest and most conscientious ophthalmological workers in times past have not been entirely exempt. Obviously *time* must be an important element in determining whether a given set of occurrences are really facts or only coincidences. The following observations are submitted with this conviction steadily in view and with the hope that the error above referred to will not be committed.

Thoroughly realizing that "two swallows do not make a summer," I wish to put upon record as succinctly as possible, brief notes of three cases of glaucoma (seen within the past 17 months), the treatment and results. This contribution is not offered dogmatically or as an affirmative statement of fact, but rather interrogatively, in the hope that other of our confreres will be disposed to pursue the subject further until it is determined definitely whether the apparently successful termination of these cases without iridectomy was coincidence or the legitimate result of treatment. It is not presumed that putting on record the histories of these cases can accomplish more than to stimulate further investi-

gation along the lines and in the channels herein indicated. If such result is reached, the writer's present purpose and desire will have been abundantly met.

It is quite generally agreed among ophthalmologists that notwithstanding the introduction of iridectomy by Von Gräfe, we are yet very far from having heard the "last word" both as to the etiology and treatment of glaucoma. Nor will it be denied that there is at present a lack of substantial unanimity as to the exact pathology of this disastrous ocular disease. It will, I think, be generally conceded by those who have closely followed the subsequent histories of their glaucomatous cases that, while iridectomy *temporarily arrests* the disease and that, too, for a period more or less prolonged, it rarely, if ever, *cures*. Certainly no fact in the entire clinical domain of ophthalmology has more thoroughly impressed the writer than that however beneficent and valuable as a *means of relief* (as it unquestionably is), iridectomy cannot be relied upon to eradicate and cure the *condition* upon which the disease depends. Obviously we are attacking by our iridectomies the *results* rather than the pathological condition itself.

Moreover, the symptomatology of the disease as recorded by the various authorities writing upon the subject in recent years, is far from constant or uniform. While certain manifestations are present in every case, the disease frequently presents characteristics not strictly "classical" and quite outside the ordinarily accepted classification. Consider, for example, one of the most constant symptoms—*tension*. Has it not frequently occurred in the experience of others, as it has in that of the writer, that glaucoma, admitting of no doubtful diagnosis, has presented itself with little or no rise of tension? The opportunities for observation afforded during the past two years inclines me more strongly to believe that in glaucoma we have a *condition* rather than a disease *per se*. If this view is correct, we are enabled at once to account for and explain somewhat the vague and ill-defined phases which not infrequently characterize and makes the disease correspondingly difficult of recognition.

As briefly stated as is consistent with intelligibility, the following is an epitome of the observed features in the cases already referred to:

Case No. 1. A mechanic, 50 years of age, consulted me for a rapid diminution of visual power and great supra-orbital pain affecting both eyes, who stated that he was annoyed a great deal by "rings and circles" (halos) of light. Tension was very high,

the eyes imparting to the touch a sense of stony hardness; cornea highly anesthetic; anterior chamber very shallow. The ophthalmoscope disclosed *pathologic* cupping of both discs. Vision was reduced to less than $\frac{20}{200}$ in O. D. and $\frac{20}{100}$ in O. S. Field for form was concentrically contracted, especially on nasal side, while that for color was entirely abolished. Pulsation of retinal arteries unusually active; so pronounced, indeed, was the latter feature that patient insisted that he could count the number of his heart pulsations in the fierce "eye-throbs." The correctness of the diagnosis not being open to doubt, the serious nature of the disease was explained to the patient as well as the necessity for prompt performance of iridectomy. He peremptorily declined operative procedure. Realizing that further attempts at persuasion would prove futile in changing his determination, and with a realization of the dire consequences likely to ensue consequent upon non-interference surgically, it was felt to be a duty to advise the patient that he alone must accept the entire responsibility—that further connection with the case was declined. To the first clause of this proposition he very readily assented, but earnestly pleaded to have the "next best thing" done short of operative interference. His plea was so earnest and pathetic that I finally yielded with much reluctance to his importunity and gave him a solution of pilocarpin (4 grains to the ounce) to be instilled into his eyes every four hours till I next saw him. At the next visit he was no better. The orbital and supra-orbital pain was still intense, arteries pulsating furiously and tension more exalted. He had now been without sleep seventy-six hours because of pain. His appeal that something be done for his relief was pitiful in the extreme, but again he declined my renewed proffer of an immediate iridectomy. In sheer exhaustion of other expedients and resources, and because I was in the habit of using it in many other but less formidable conditions of ocular trouble, I proceeded to apply over each eye a mild galvanic current, the anode to the nape of the neck and the cathode, covered with moist sponge, over the affected eyeball, making gentle pressure as it was moved back and forth. At the end of a seance of fifteen minutes patient expressed himself as feeling a decided relief from pain. To my astonishment the pulsation and tension had materially diminished. I instilled a few drops of pilocarpin (this time 2 grains to the ounce) and directed him to call later in the day, when, finding the relief experienced at the earlier visit still persisting, galvanism was again applied. The second application sufficed to *entirely relieve* the pain with a still further reduction in pulsation and tension. Patient was given daily galvanizations for two weeks and thereafter thrice weekly for three weeks, at the end of which time tension was normal; anterior chamber also quite normal; cornea quite sensitive; while vision had risen in O. D. to $\frac{20}{70} +$ and in O. S. to $\frac{20}{50} +$. Field for form and color had greatly improved, but was yet far from normal. Disc still showed some excavation quite apart from the evidently deep physiologic cupping. Four-

teen months later there had been no recurrence of pain, halos of light or elevation of tension. Form and color fields had greatly improved since previous examination. Some pathologic cupping of disc was still slightly apparent, but no appearance of a progressive atrophic condition. Patient had previously been given this correction for distance:

O. D. +1.50 Cyl. Ax. $75^{\circ} = \frac{20}{40}$.
O. S. +1.10 Cyl. Ax. $165^{\circ} = \frac{20}{30}$.

with the added presbyopic spherical correction necessary for near work.

Case No. II. Book-keeper, 46 years of age, complained of "confusion and swimming of sight" (halos), much orbital and infra-orbital pain commencing towards evening and growing more severe as night advanced. Tension exalted; cornea *entirely insensitive* so as to permit of being touched by the finger; anterior chamber shallow; lens and vitreous clear except a greenish reflex not observed in case No. 1. Fields for both form and color much circumscribed and almost entirely cut off on the nasal side. Vision: O. D. = $\frac{20}{160}$; O. S. = $\frac{20}{130}$. Early iridectomy was urged, but patient declined. Being an acquaintance of patient No. 1, "whose eyes had been saved without an operation," he insisted that he should receive similar treatment. Vainly I urged that case No. 1 was quite exceptional and that such a happy and unlooked for denouement could not again be expected, and might have been purely accidental. But despite all he remained obdurate, preferring, as he said, "blindness to mutilation." I therefore undertook the treatment of his case, first divesting myself of all responsibility for whatever untoward issue that might follow his dogged rejection of proffered operative interference. Galvanism, as in case No. 1, was employed, resulting at the first sitting in marked diminution of tension and relief of pain. Pilocarpin was instilled and patient directed to report daily. After nineteen additional galvanizations, patient was dismissed with vision in O. D. $\frac{20}{70}$, and in O. S. $\frac{20}{50}$. Correcting the refraction gave vision as follows:

O. D. + 1.75 Cyl. Ax. $15^{\circ} = \frac{20}{40}$.
O. S. + 1.37 Cyl. Ax. $105^{\circ} = \frac{20}{35}$.

This correction is still worn with comfort. Eleven months later patient reported no recurrence of glaucomatous symptoms. Both form and color fields showed great improvement. Nerve heads while slightly cupped beyond the physiologic condition showed no progressive tendency toward atrophy, the interior of the eye being otherwise healthy in appearance.

It is interesting and important to note that while there was much less cupping in case No. 2, and less limitation of vision, *there was also much less improvement in visual acuity, either with or without correction*, than was readily obtained in case No. 1.

Case No. III. Young lady, 29 years of age. Had been a school-teacher for four years, and the last three years preceding

her visit to me, an accountant. She informed me that her eyes had been "troubling" her for several years, but she had refrained from consulting an oculist, fearing glasses would be prescribed. She was now ready to wear glasses, to obtain which was, as she frankly told me, the occasion of her present visit. A cursory examination revealed a widely dilated pupil in O. S. Ophthalmoscopic examination disclosed choking as well as cupping of the disc and a very pronounced greenish reflex. Cornea was anesthetic to a marked degree; anterior chamber very shallow; tension considerably increased, but less markedly so than in either of the two preceding cases. Pain was very severe only when and immediately after using the eyes. Halos of light were particularly annoying. Fields both contracted; vision $\frac{20}{100}$. Diagnosis: Mild attack of glaucoma simplex in O. S. Interior of O. D. was normal otherwise than as to refraction, being hyperopic 2.50 D. and astigmatic (hyperopic) 1.00 D., axis 110° . Iridectomy was not proposed to this patient. Recalling the two previous successful experiences with pilocarpin and galvanism and this being apparently a safer case in which to procrastinate because much less severe, I determined to again put the previous treatment to the test, hoping thus to determine whether its *apparent* success was coincidental or actually remedial. A mild current of galvanism was applied, but this time the poles were reversed, the cathode was placed at the nape of the neck, and the anode, covered with sponge, over the ball of the affected eye. The reversal of the poles was not made so much by design as through indifference. It was not apprehended as very material which pole was placed over the eye-ball. After a seance of five minutes my patient begged me to desist, declaring that the pain, which was slight at the beginning, had now become unendurable. Removing the sponge it was found that tension had risen about one-half, thus sustaining a tolerably close proportionate relationship to the increase in the degree of pain. Pilocarpin was instilled and an opiate prescribed, with instructions to call early the following day. Patient reported that on account of intense pain she had passed a sleepless night; that her vision was less good, and in every way was worse than when she first called on me. I now proposed iridectomy, but patient demurred, saying she had already been made much worse by what had been done the preceding day and "wished no more experiments tried" on her. Recalling that the galvanization of the day previous had been made with a reversal of the poles as employed in the first two cases, it was determined to make another attempt with the cathode this time over the ball of the affected eye. It required considerable persuasion to induce my patient to consent to another seance. Succeeding finally, however, in gaining her consent to submit to another trial, a very weak current was applied by placing the cathode over the closed lid, with the anode at the base of the occiput. I resolved to proceed tentatively and gradually increase the current if found to be well borne. Finding that the pain was not being increased, more current was applied

from time to time as the seance proceeded. At the end of twenty minutes my patient rose from her chair declaring that she felt "90 per cent better,"—that the pain was almost gone. The tension had certainly diminished also in about the same ratio. This method of treatment was continued daily for one week and every other day for the next three weeks; using, meantime, a weak solution of pilocarpin, at the end of which time tension was normal and had been so for a fortnight; cornea quite sensitive; anterior chamber fully re-established, and vision had risen from $\frac{20}{100}$ to $\frac{20}{50}$. Scarcely any cupping or congestion was perceptible at the disc. Form and color fields showed improvement. Patient was directed to report occasionally for examination and to refrain from using her eyes as much as possible for the next six months. At the end of one year the ophthalmoscopic appearance of the eye is quite normal; there has been no pain or increase of tension, and the field for both form and color (which in all of the three cases was the slowest to show improvement) was about normal. With the erroneous refraction corrected vision is a good $\frac{20}{20}$ in the previously affected eye.

It is to be observed that this young lady is much under the age at which we are supposed to expect glaucoma, and yet in most respects her case presented more of the typical or classical symptoms of the disease than either of the others, with the single exception of there having been less pain. Nevertheless, judging from external and internal appearances, visual and form fields, absence of pain, etc., the case may be said to have been absolutely cured, inasmuch as nothing commemorative of the original seizure now remains.

I have refrained from reporting these cases sooner because of a desire that at least a full year should elapse before doing so. It will be observed that in cases Nos. 1 and 2 considerably more than that time has already passed. I have notes of two other cases which promise equally satisfactory results, but sufficient time has not yet elapsed to warrant their being reported.

As was stated at the outset, it is not contended that these cases are *cured*, or, indeed, that glaucoma is ever cured in the sense in which that word is ordinarily employed and understood. All that is claimed is that these *were genuine cases of glaucoma*, such as would unhesitatingly be treated by iridectomy alone. The writer has witnessed scores of iridectomies done by the ablest of ophthalmic *diagnosticians* as well as surgeons where the glaucomatous symptoms were very much less marked, and in some instances where they were, indeed, quite obscure. Furthermore, it has been my undeviating custom to operate in all cases of high tension and anesthetic cornea, accompanied by pain and disturbance of vision,

without waiting for cupping of the discs or other symptoms which are usually considered typical indications of glaucoma. *Let it be understood, then, that there was absolutely no reason for not promptly operating in these cases except the positive refusal of the patients to have it done.* The employment of other expedients was greatly against the writer's judgment and advice, and had the patients been less obdurate, would not have been given a moment's consideration.

It is submitted, in this connection, that the results in these cases *without operative procedure were certainly as good as any ever obtained by it, and in case No. 3, better.* Certainly an iridectomy done under such circumstances and yielding the results indicated above might justly be regarded as highly and gratifyingly successful.

The only residuum of doubt may perhaps be best formulated interrogatively thus: *First.* Was the galvanic treatment, as indicated above, the potential curative factor, or was it the pilocarpin alone. *Second.* If neither, was it then purely coincidental? *Third.* If coincidental, will a certain percentage of glaucomatous cases always spontaneously recover without any treatment; or, if not *recover*, improve to such an extent and persist sufficiently long as to induce the *belief* that they are actually cured?

It is no part of the writer's present purpose to essay an answer to these queries or to dogmatize upon them. The results are submitted with the hope that the questions to which they seem naturally to give rise may receive that investigation at the hands of ophthalmologists that the gravity of the subject merits, for is not glaucoma and its treatment still the *bete noire* of ophthalmic medicine?

Remanding the above questions to future determination, a few considerations as to the probable curative action of galvanism may here appropriately find place. It must be conceded that the application of galvanism in each of the three cases above mentioned was followed by an *effect* which, as we have seen, was an immediate and continuing beneficial one. It is interesting and profitable to inquire *how*—in what manner—the galvanic current operated in thus producing amelioration of pain, reduction of tension, etc.? Was it through its action upon the nervous structure of the eye *per se*, or through a modification of neural nutritive processes by absorption of exudative products,—in short, was the electric action sedative or stimulative? In order to properly consider these points it is advisable to consider briefly some of the prev-

alent views as the pathology of glaucoma. I think the preponderating weight of authority is inclined to hold defective elimination (notably at the filtration angle) as the immediate causative factor in the production of the disease. Certainly the secondary effects of the disease are always found in intra-ocular pressure. Opinion may well divide as to whether this pressure is the result of some vice directed against the nerve supply of the eye so as to bring about a perversion of nutrition and, consequently, of function but which is still disconnected with and remote from the eye, or whether the origin of the trouble begins in the eye *per se*. Under the latter theory would be comprehended bad refraction errors with its resultant eye-strain,—in fact, anything likely to modify or pervert nutrition.

Priestly Smith, after a somewhat protracted study as to the immediate causes of increased ocular tension, states that he believes it may result from three conditions, viz: "Hypersecretion by the ciliary processes; serosity of the fluids, and obstruction at the filtration angle." In either or all of these conditions galvanism would seem to be indicated as the agent best calculated to modify and limit the morbid processes. That *practically* it has not always succeeded in accomplishing all that might reasonably be expected of it *may* be due somewhat to the unskilled and perfunctory manner in which it has been employed.

Von Gräfe believed increased secretion was the result of inflammation of the choroid, while Donders held that the increased secretion on the part of the choroid was due to an influence directed upon the ciliary nerves.

Both Weber and Knies hold that the ciliary processes swell up in consequence of venous stasis so as to press at their apices against the posterior surfaces of the iris. Displacing the marginal portion of the iris forward, it becomes adherent to the anterior portion of the sclera and margins of the cornea. The normal sinus of the anterior thus becomes obliterated. Attaching the iris to the ligamentum pectinatum closes one of the most important exits of the eye, *i. e.*, into Schlemm's canal—and it follows that an excess of fluid must remain in the eye. The desideratum, therefore, is to reopen the closed gateway.

Dr. Noyes, in his recently revised edition of "Diseases of the Eye," after carefully reviewing the different theories as to the causation of increased tension (which is really glaucoma), gives the weight of his opinion to the "retention theory," thus sharing the views of Knies¹ and Weber² first promulgated in 1876:

¹ Von Graefe's Archiv. vol. XX., p. 3.

² Von Graefe's Archiv. vol. XX., p. 1.

Priestly Smith, investigating along the same lines at a later date, found in eighty eyes affected with different varieties of glaucoma, obstruction at the filtration angle in all but three. He summarizes thus:

"The causes of primary glaucoma, then, are various and complex, and are not yet completely known, but they are alike in this—they all lead to compression of the angle. With that compression the actual glaucoma process begins. * * * The fluid which still exudes from the turgid ciliary body is albuminous and less diffusible than the normal secretion; it tends to accumulate behind the lens, and this latter, being pressed forward, intensifies the mischief. Thus cause and effect react upon each other in a vicious circle."

It being substantially agreed, then, that whatever the initial cause, defective drainage at the filtration angle is the *immediate* cause of the pressure, it is important to inquire what is the pathologic change that occurs? Ophthalmic surgery has certainly indirectly recognized the existence of an obstruction or constriction somewhere in the region where Knies locates it (ligamentum pectinatum bound by exudation to the iris), by removing a part of the iris in their iridectomies. The desideratum would seem to be the removal of the constriction and liberation of the filtering function of the eye. *Now must that be secured by destructive agencies alone?* It was thought before the advent of the Apostoli method of absorption by the catalytic action of the galvanic current that fibroid tumors of the uterus could only be removed by the destructive agency of the knife. It is doubtful now if any gynecologist of repute would think of resorting to the use of the knife for the extirpation of uterine fibroids without first having made a thorough trial of the Apostoli method by galvanic absorption.

If the galvanic current is capable of causing absorption of a growth in the uterus many times larger than the human eye-ball, is it unreasonable to believe it capable of absorbing the adhesions or whatever the occluding substance may be that prevents the proper filtering of the ocular fluids at the iritic angle? If removing a piece of the iris surgically in order to afford room or another channel for the escape of the imprisoned ocular fluids is the most approved method of relieving intra-ocular pressure in glaucoma, why is it not quite as reasonable to attempt by catalysis the absorption of the occluding elements which have interfered with and perverted the natural course of drainage? Is not this precisely what we endeavor to accomplish every time we slit the canaliculus

and probe the lachrymal duct? The object sought is the restoration of physiological function, and to accomplish it usually two methods are presented: Restoration of function by changing the perverted to a healthy nutrition, or the destruction of the products of mal-nutrition by surgical processes.

With the galvanic current by its catalytic action we accomplish both results simultaneously. By its stimulating properties the current favorably modifies nutritive processes and at the same time causes the disappearance of mal-products by absorption. Therefore, while iridectomy meets the demand for more room, it neither modifies nutrition nor causes absorption of occluding substances. By iridectomy, physiological function is only re-established by removing a part of the iris, which is thus made to act vicariously, inasmuch as that is not claimed to be the primary offending or obstructing cause. Obviously if the view of those ophthalmologists who assert that the pathogenesis of glaucoma is interference with the nerve nutrition of the eye through either over or under stimulation be correct, it will be seen that iridectomy cannot theoretically promise as much in the way of relief and cure of the disease as galvanism.

Let me at this point quote from Liebig. Speaking of the "Vasomotor Effects" of the galvanic current he says:

" * * * It has been mentioned that the galvanic current produces variations in the caliber of the blood vessels at the points of the application of the electrodes. Similar modifications of the vascular caliber are produced by a stimulation of certain nerve centers."

Also, under "Trophic Effects," he says:

"Although our knowledge of a trophic system of nerves is still very indefinite, we may assume the existence of such nerves to aid us in explaining the phenomena of nutrition. Whether galvanism has any effect upon the trophic nerve is immaterial in the face of the fact that it undoubtedly has a decided influence upon nutrition. Atrophies of organs or tissues are often favorably modified by the galvanic current."

An iridectomy has only to do with the sequella of the glaucomatous attack by affording room for the re-establishment of physiological function. Manifestly it neither affects nor alters the neural impulse upon which the disease is believed by many to depend. Neither does it seek to regenerate the affected area by restoring the impaired function. Galvanism, on the other hand, is capable of meeting both these requirements, and that, too,

simultaneously. It is not necessary to dwell upon the catalytic quality of the galvanic current, because the absorption of exudates by this means has already become too well established in various branches of medicine to admit of serious argument. It would seem, therefore, that the better would be the more physiologic treatment, of attempting the absorption of the products of a glaucomatous attack rather than to pursue a roundabout and vicarious method, as is done in iridectomy, thus permitting the anatomical restoration of the affected parts so that normal physiological functions may become re-established and resumed.

But I may be told this does not cure the disease! Neither does iridectomy do so. By excision of a piece of the iris a new conduit for the escape of the imprisoned fluids at the filtration angle is provided, thus relieving occlusion, and by so doing making possible a reduction of intra-ocular tension. This, however, does not deal with the *cause*, but only with the *effects* of the disease. Restore the occluded area by absorbing the exudative products and tension must decline with the re-establishment of normal secretory processes. But here again we are dealing only with effects. The constant current, however, promises us theoretically not only as much as iridectomy, but a still better result, because its mission is that of repair instead of the partial obliteration of an unoffending part.

But when the *primary* cause of the disease is considered, the advantage of galvanism over iridectomy appears still more pre-eminent. Galvanism has been demonstrated to be capable of increasing or decreasing (depending entirely upon the mode of its application) nerve inhibition and, consequently, affecting the nutritive function of the part which it supplies. If the pathogenesis of glaucoma is a perversion of nervous energy, why not modify or discipline it with the expectation that by so doing the disease will be both arrested and its baneful effects removed *simultaneously*, the latter being attained through the catalytic quality of the current employed for accomplishing the former purpose?

In this connection, I quote entire the valuable diagram prepared by Dr. William J. Morton, of New York (to whom we are indebted for so many scientific and practical contributions in Electro-Therapeutics), and which is published in his brochure, entitled: "Upon a Possible Electric Polarity of Metabolism and its Relations to Electro-Therapeutics and Electro-Physiology," which will serve to better indicate the possible benefits of the constant current in respect to the subject under consideration.

All active centers of chemical exchanges (metabolism, health, disease) are electro-positive.	Metabolism, chemical exchanges over-active.	An applied + pole increases the activity; <i>i. e.</i> , augments the disease.
		An applied — pole decreases the activity; <i>i. e.</i> , cures the disease.
	Metabolism, chemical exchanges under-active.	An applied + pole increases the activity; <i>i. e.</i> , cures the disease.
		An applied — pole decreases the activity; <i>i. e.</i> , augments the disease.

Attention, in this connection, is invited to the fact that in case No. 3, hereinbefore cited, the anode was inadvertently or carelessly applied to the eye-ball, with the result of aggravating markedly the pain and causing an increase of tension, whereas reversing the poles secured, as in cases No. 1 and 2, an almost immediate diminution of pain and tension. This incident, if it is significant at all, would appear to be an important contribution to our present knowledge as to the pathology of glaucoma and indicates that in this disease we have to deal with a condition of over-activity of nerve function. By reference to the diagram of Dr. Morton it will be observed that in over-activity the cathode or negative pole is the proper one to apply to the orbit. As a matter of fact, it was that pole which was applied in the cases cited that subdued pain and reduced tension, whereas the application of the anode or positive pole markedly intensified the distress of patient No. 3 and accelerated tension. Whether this result was in obedience to a great but not yet well understood law or was a mere coincidence, I do not now presume to assert; but having put this data upon record, am content to await the developments of further investigation and fuller knowledge for its final determination.

No. 15 North Main Street.

IS THE PHYSIOGNOMY OF THE FUNDUS OCULI IN EPILEPSY CHARACTERISTIC?

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EVER since the employment of the ophthalmoscope as an objective aid in diagnosing cerebral and spinal disorders, the neurologic has been looking to the ophthalmic world for the description of those fundus pictures supposed to indicate certain conditions of the central nervous system. About none has there been more discussion than the ophthalmoscopic picture in epilepsy, perhaps because of the important place that disorder occupies in the category of nervous diseases.

Unfortunately, so wide has been the variance in results, that a prominent neurologist of Brooklyn* has recently stated that "until ophthalmologists can offer more definitely accepted positive results, we are warranted in ignoring the retinal appearances so far as the epilepsy is concerned."

The literature of the subject is vast; to illustrate the diversity of opinion a few authorities will be quoted:

Cross¹ in 95 cases finds no change in the majority of instances; when changes in circulation are noted, they are so various and widely dissimilar that no conclusions could be drawn. Allbutt², of England, has seen pallor of the optic discs, as has also Hughlings-Jackson³ and Alldridge.⁴

Hammond⁵ believes that the fundus of an epileptic eye is always congested or pale, and evidences cerebral plethora or anemia, and he sees a venous pulse in all cases of epilepsy with plethora.

*Dr. William Browning.

Teboldi⁶ has also recognized pallor of the papilla, increase in the venous circulation and immediately after an attack marked congestion of the veins with relative emptiness of the arteries. Gowers⁷, who is a high authority, states: "In idiopathic epilepsy the appearance of the fundus oculi between the paroxysms is as a rule normal. Some observers have described changes in the optic discs and increased vascularity, distended retinal vessels and the like. I have examined very carefully about 1000 epileptics and have found that in most cases every character of the fundus was *such as is presented by persons not epileptic*†. Now and then an unduly red disc is to be seen, but not more frequently than in non-epileptics, and in these cases it is explicable by the ocular conditions—a point too little attended to in medical ophthalmoscopy. The only deviation from the normal state of the fundus which has seemed to me frequent is an unusual equality in size of the retinal arteries and veins; the latter are not as a rule larger than normal, and the arteries appear as if large from a lax state of the vessel wall. Spontaneous pulsation in the veins has been described by Kostt and Neimetschek⁸ as especially frequent in epileptics; it is certainly not more frequent than in persons who are not epileptics."

Our last quotation will be from Oliver⁹. He concludes from his studies on epilepsy (at the State Hospital for the Insane at Norristown, extending over a period of seven years) that "the morbid process of cortex disease, as seen under the microscope, if long continued and if of any moment, can be recognized antemortem ophthalmoscopically in the optic nerve head and retina by similar relative changes of diseased action in these latter tissues." The changes in the optic nerve head and retina are "a low chronic form of retinitis and peri-vasculitis that is associated with a dirty (red-gray) incipient degeneration of the optic nerve."

Thus it will be seen that the testimony of observers is sadly conflicting.

Cross finds no change in the majority of cases. Gower's examinations of 1000 cases result in negative conclusions. On the other hand, Allbutt, Hughlings-Jackson, Aldridge, Teboldi and Oliver find fundus alterations varying from a mere disturbance of the circulation to a low-grade neuro-retinitis.

A well-defined generally accepted conclusion as to the physiognomy and import of the epileptic fundus oculi is not yet possible. It can only be obtained by a summary of the results of

†Italics my own.

accurate observations carried on and recorded by various investigators.

It is with this conviction that the writer records his own experience, gleaned from one years' ophthalmoscopic study on epileptics at the State Hospital for the Insane at Norristown, Pa., during his residence at that institution. In this study the following precautions were observed.

1. Only selected cases of non-focal epilepsy were admitted to the study.

2. Subjects were chosen whose eyes were free from extraneous diseases. Inflammatory or traumatic eyes were omitted so as to obtain, as nearly as possible, representative peripheral organs.

3. Males were taken. These were chosen to avoid any conflicting findings that might be the result of special feminine characteristics.

4. No subject was examined within less than 24 hours after a convulsive seizure. These observations therefore belong to the interparoxysmal period of epilepsy and were intentionally made at that time, for it is during that period that the patient is generally seen by the practitioner.

5. All ophthalmoscopic observations were made under a mydriatic. This was done with particular reference to the macular region, the careful study of which is hardly feasible with a mobile iris.

6. Every subject was submitted to the same routine examination under the same conditions, thus obviating any seeming gross changes that might arise from differences in the method of study. As Oliver¹⁰ says: "The reasons for such rules are obvious, as by their observance all faults in working and want of precision in method are reduced to a minimum, and the conclusions, which are the very essence of the work, are thus rendered more valuable and less liable to gross and deceptive error."

Out of this study, conducted in the specified manner, grow the following observations:

First. In a number of cases the optic disc was superficially overcapillary, and in its deeper layers greyish and sometimes grey.

Second. In quite a number of instances the scleral ring was sharply cut, especially to the temporal side.

Third. In many instances the retinal lymph channels were distended and visible as glistening milky white opacities, occasionally along the vessels, but most frequently at the vessel entrance on the disc.

Fourth. In a goodly number of cases the fiber layer of the retina was seen much thickened, this condition being most pronounced superiorly and inferiorly.

Fifth. In a number of other instances the arteries were found a little wavy.

Sixth. In several instances the vessels on the optic disc surface were quite tortuous.

Seventh. In several cases the veins showed tortuosity.

Eighth. In a few instances pulsating veins were noticed.

Ninth. In a very few instances the macular arterial twigs were tortuous.

Tenth. In a few instances the chorioid in the macular region was granular. Particular notice was given to this last feature, as it was considered of some importance. Frequently it happened that conditions at first strongly suggestive of granular choroiditis disappeared under accurate focusing with the ophthalmoscope.

If we were to attempt now to draw a type picture of the background of the eye of an epileptic, it would be about as follows:

1. A superficially over-capillary optic disc showing greyness in its deeper portions.
2. A scleral ring, sharp cut temporally.
3. Increased thickness of the retinal fiber layer more marked at the superior and inferior margins of the nerve head.
4. Distension with opacity of the retinal lymph sheaths, more especially on the optic disc surface.

However, this group of ophthalmoscopic findings does not differ from that which the writer has frequently observed in low-grade neuro-retinitis consequent upon eye-strain. In this connection he wishes to remark that the great majority of epileptics included in the above study exhibited hyperopia or hyperopic astigmatism in amounts ranging from 1.00 to 4.00 diopters, the average being 1.47 D*.

A very few were practically emmetropic and a few more myopic in slight degree. It may be, as Gowers⁷ claims, that the neuro-retinal conditions of the epileptic fundus oculi are explicable by the ocular conditions. At any rate, in casting about for causative factors the ocular conditions are well worth weighing.

The author has no conclusions to offer. He feels that until the above study has been supplemented by extended work among epileptics he is not justified in putting forth positive statements.

* Measurements made under mydriatic with ophthalmoscope.

However, in concluding, he wishes to contend that in the present state of ophthalmic science, the claim that the background of the epileptic eye is the visible peripheral expression of correlated changes in the cerebral cortex, must be accepted with reservation.

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AN ARGUMENT FOR AMBLYOPIA EX-ANOPSIA IN CONVERGENT STRABISMUS.¹

BY W. FRANKLIN COLEMAN, M. D.,
OF CHICAGO.

GENTLEMEN: You will bear with me this evening in a departure from my tri-weekly clinical lectures, in presenting a didactic argument for the entity of amblyopia ex-anopsia and supporting it chiefly by citing the improvement in the vision of patients operated upon by myself for convergent squint. Whether you consider the amblyopia, usually present, to be a cause or a consequence of the deviation, is of great practical moment for your decision in regard to an early operation.

Among the supporters of the view that the amblyopia of squint is caused by disuse of the eye are Albert von Graefe, Donders, Leber, Stellwag, Wells, Juler, Theobald, Schmidt Rimpler, Berry, Fuchs, etc. Opposed to it are Schweigger, Wadsworth, Laudolt, Noyes, Roosa, de Schweinitz, Ulrich, Segger and others, who maintain the amblyopia is congenital.

Dr. A. F. Wadsworth, in an able paper in the *Boston Medical and Surgical Journal*, January 20, 1887, says: "The theory of amblyopia ex-anopsia was universally held until 1871, when Schweigger denied the amblyopia is so produced and asserted it to be a congenital defect." By 1876 Wadsworth was in agreement with Schweigger.

Having searched a fair amount of readily accessible literature, we will first present the arguments against the theory of amblyopia from disuse there produced, and next give the views in support of the theory, and give warning of our attempt to support the affirmative.

The claim of Noyes and Wadsworth that monocular congenital amblyopia is not rare is readily admitted, and that it is a very

¹ Part of an evening lecture in the special course for January, 1895, at the Post Graduate Medical School of Chicago.

active factor in the causation of certain cases of squint is conceded. The question reduced to its simplest terms is: Does the more or less continued existence of a strabismus *per se*, induce an amblyopia?

Of prime importance for the solution of the question is a knowledge of the acuity of vision before the squint. Unfortunately this evidence is largely excluded on account of the early age (before 7) at which the deviation begins, and the meager opportunity for an early examination.

Schweigger asserts that no one has ever proved that an eye, which once saw well, has become amblyopic after the occurrence of squint. This would be a knock-out blow in the first round did it but strike with the force of fact. A few cases to the contrary (to be cited) will defend and more than arm his opponent.

Wadsworth "has never seen satisfactory evidence that vision of the squinting eye improved after operation;" and much to the same effect from Schweigger, Alfred V. Graefe and Noyes, who account for the "apparent" improvement by "incorrect examinations carelessly made," etc. The use of such weak material in the contest evinces a great lack of good ammunition.

This very denial of Wadsworth's in regard to vision is an admission that improvement would be evidence in favor of argamblyopia. Though Roosa contends that if such improvement occurs it is only a "post hoc." Opposed to this is the fact that if the amblyopia in squint is congenital it will remain permanent. The increase in vision is often too great to be set down to carelessness in testing, and, when it is moderate, why should not the early test be as well accredited as the post operative.

Schweigger states that in some cases of monocular squint of years' standing, vision in the squinting eye is as good as that in the other eye. Then, if vision is normal in the other eye, there is no amblyopia to account for. At most it is admitted as existing in "some cases" only, and goes to enforce the rule of low vision in a squinting eye. It is not an argument in favor of congenital amblyopia and may not be against amblyopia from disuse, for, possibly, in rare cases a high refractive error and weak externus of one eye may cause it to squint, though its vision may be somewhat greater at first than its fellow, and after the squint amblyopia may occur. Also, "a high degree of amblyopia in other recent cases," may be evidenced if the squint is extreme or a congenital amblyopia be present, and still not disprove the existence of an amblyopia from disuse.

Again, Schweigger asks, why do we have diplopia in paralytic and not in concomitant squint, and answers that, in the latter, retinal identity has not been established (an argument for congenital amblyopia).

We reply: The evidence for the establishment of "retinal identity" is manifest, inasmuch as diplopia *is* present in many cases of early squint, although it disappears later by habitual suppression of the excentric image and lowering of vision.

The deduction (by Schweigger) that the theory of suppression is invalid, because the image of a candle made to fall upon the macula of the squinting eye is seen, while the opposite eye sees an object it fixes, is sufficiently refuted by Theobald, who says the amount of suppression which is adequate to prevent the annoyance of double vision is less than that required for loss of light perception of a candle flame. But we cannot agree with Theobald when he states structural changes occur in the visual centers in time (during suppression) for that would preclude the increase in vision which takes place after operation for squint.

The experience of Schweigger and Wadsworth that in 30% of strabismus, vision is greater than $\frac{1}{7}$ is not unusual, yet it does not seem evidence against the exclusion theory. It rather demonstrates the great majority can by alternate fixation maintain relatively good vision.

The observation of Wadsworth that vision is very commonly as low as $\frac{14}{30}$ in non-squinting eyes needs no denial in this discussion. In refutation of the claim for a characteristic central amblyopia in squint, with good peripheral vision, Wadsworth is sure there is "partial central scotoma" in monocular congenital amblyopia. His view is not shared by observers in general, who describe a total defect of vision in such cases.

Noyes (2d ed., p. 182) refers to Schweigger's statistics thus: "This increase of the ratio of amblyopia, with the increase of the degree of the hyperopia in squint, points unerringly to the dependence of amblyopia upon congenital defect and not upon disuse." True, there is a congenital amblyopia associated with a high degree of (and proportionate to the) hyperopia in non-squinting eyes also. These two factors would be necessarily associated in strabismus and be added to the amblyopia of disuse. At least the statistics do not tend to disprove the latter view.

Wadsworth cites fifteen cases of monocular congenital amblyopia without squint. The very rarity of such instances, as com-

pared with the great frequency in squints of amblyopia, is very conclusive evidence that the latter is not congenital but acquired.

Next the affirmative side: A forcible paper, "Amblyopia of squinting eyes; is it a determining cause or a consequence of squint?" by Dr. Samuel Theobald, is found in *Trans. Amer. Oph. Soc.* 1886. He states the well-known characteristic of the amblyopia in squint which distinguishes it from that which is congenital. In the former the amblyopia belongs to the macula and the position of the false image, while vision is good in the periphery of the retina not concerned in the common field of vision. In the latter (congenital) the vision is never of the above character, the amblyopia is general and the fixation is central. Again: "If amblyopia is congenital the squint should come on early in life, but it usually appears when the child begins to read." Further: "The almost immediate restoration of binocular fixation after operation is against the theory of non-acquisition of retinal identity (and the correlated doctrine of congenital amblyopia) and in favor of the exclusion theory." With others, he maintains, the amblyopia is greater in long continued squint.

In opposition to amblyopia ex-anopsia, Noyes says the exclusive use of one eye does not in monocular cataract bring about amblyopia. While this holds good in senile cataract, in which the retina has once acquired its full function, it is not applicable to congenital cataract. Fuchs (p. 387) says: "If the cataract (congenital) is not operated upon (early) the development of the retina is arrested and amblyopia ex-anopsia is produced."

Finally we come to the argument for amblyopia ex-anopsia from the standpoint of improvement of vision after operation on convergent squint.

The following twenty-five cases are taken from Roosa's instructive report showing increase of vision after operation; stated in per cent by myself: 25% gain in one, 33% in one, 50% in ten, 100% in five, 300% in four, 400% in one, 700% in one, 1000% in one. In one, vision improved from light perception to $V=\frac{1}{10}$. Roosa reports 17 cases with same vision after operation as before and 31 in which with glasses and atropin it improved generally in one eye. And with this experience (*mirabile dictu!*) he adds: "These cases prove little for the theory of amblyopia ex-anopsia."

Roosa affords the following case, which refutes Schweigger's assertion that no case of normal vision before squint has been shown to acquire amblyopia after.

February 11, 1880, aet. 7 yrs. Periodical convergent strabismus.
 R., V. $\frac{20}{20}$; L., V. $\frac{20}{20}$. February 18, 1880, $\left. \begin{array}{l} + \\ \text{At} \end{array} \right\} \text{R.} + \frac{1}{8} \text{V.}$
 $= \frac{20}{20}$. L. $+ \frac{1}{8} \text{V.} = \frac{20}{20}$. Wearing $\frac{1}{10}$. March 3, 1884.
 R., V. $= \frac{20}{100} + \frac{1}{10} = \frac{20}{100}$; L. $+ \frac{1}{10} = \frac{20}{20}$.

Roosa is forced to admit: "In this one case the lapse of four years does seem to have blunted the vision of the squinting eye.

Schmidt Rimpler relates as strong a case: "I operated on a boy of 7 years of age with severe strabismus convergens of the right eye. At the time of operation vision of the right eye was $\frac{20}{20}$ ($H = \frac{1}{40}$), but without binocular vision. Convergence of $1\frac{1}{2}$ mm. remained. Ten years later vision = fingers 4 m. (13 ft.) and fixation with inner part of the retina. There had been no disease of the eye in the meantime.

Knapp in 1863 had a patient whose vision increased from $\frac{1}{10}$ before to $\frac{1}{2}$ after operating.

Dr. Eugene Holt, *Trans. Amer. Oph. Soc.*, 1885, reports girl aet. 9. R. eye deviates in 35° and under all tests at two days' interval, totally and absolutely blind. Oph. exam. negative. One week after tenotomy and advancement V. = fingers at 50 cm. Eight days later V. $= \frac{1}{24}$.

Harlan produces one instance of increase of vision from $\frac{20}{50}$ to $\frac{20}{200}$. The most convincing illustration I have seen of "amblyopia from suppression of the visual image" was furnished by Dr. W. B. Johnson at the twenty-ninth meeting of the Amer. Oph. Soc. T. McK. at 19. June 3, 1887. Cross-eyed since 3 years of age and unable during his recollection to see anything with his left squinting eye. R. V. $= \frac{20}{15}$; L. V. = fingers 6. Fundus normal. June 13th. Right eye lost from blow of hot file—enucleation. June 18th. V. L. E. = fingers 3". Instructed in locating letters and repeated later. July 1st. V. L. E. $= \frac{20}{15}$ and J. No. 1 at 12. Field normal. Three years later V. $= \frac{20}{15}$.

In the discussion, Noyes spoke of an equally remarkable case of Javal and gives this explanation: "The cerebral function is in suspense and loses conscious activity." This we are as willing to accept as to assume the amblyopia to be ocular. The former is as conclusive for acquired amblyopia of squint as the latter.

Dr. Risley: "I operated on one case in which the right eye was amblyopic. In four years vision was $\frac{6}{6}$; later the left eye could barely count fingers. Operated and prescribed glasses. In three months V. $= \frac{6}{7}$.

The table on next page is made up of cases from my own practice taken in succession (without selection), which I carefully tested before and after operation.

TABLE SHOWING VISUAL ACUITY BEFORE AND AFTER

No.	AGE.	FORM AND DEGREE OF SQUINT	DURATION OF SQUINT	REFRACTION AND VISION
1	27 years	Monocular R=4"	19 years	Acc. R. $+1\frac{1}{8} = \frac{1}{6}$ " L. $+1\frac{1}{8} = \frac{1}{6}$
2	17 years	Alternating L=3" R=2"	13 years	Acc. R. $+1\frac{1}{8} = \frac{1}{6}$ " L. $+1\frac{1}{8} = \frac{1}{6}$
3		Monocular Conv. R. E.=8"	Since aet 2 yrs.	R. E. V. = $\frac{1}{20}$ Cannot read J. 20 L. E. V. = $\frac{1}{20}$
4	13 years	Alternating Conv.=3"	Since aet 3 mos	Acc. R. E. $+1\frac{1}{8} V. = \frac{1}{6}$ " L. E. $+1\frac{1}{8} V. = \frac{1}{6}$
5		Alternating Conv.=2"		Acc. R. E. $+1\frac{1}{8} V. = \frac{1}{6}$ " L. E. $+1\frac{1}{8} V. = \frac{1}{6}$
6	21 years	Alt. Conv.=2"	Began at aet 8 mos	Acc. R. E. $+1\frac{1}{8} V. = \frac{1}{6}$ " L. E. $+1\frac{1}{8} V. = \frac{1}{6}$
7	16 years	Monoc. R=2"	8½ yrs.	Acc. R. E. $+1\frac{1}{8} V. = \frac{1}{6}$ " L. E. $+1\frac{1}{8} V. = \frac{1}{6}$
8	10 years	Alt. R. or L.=3"	Since aet 3 mos	Acc. R. E. $+1\frac{1}{8} V. = \frac{1}{6}$ " L. E. $+1\frac{1}{8} V. = \frac{1}{6}$
9	4 years	Alt. Conv.=3"	3 years	R. E. V. = $\frac{1}{20}$ L. E. V. = $\frac{1}{20}$
10	13 years	Monoc. R.=2"	11 years	R. E. $+1\frac{1}{8} V. = \frac{20}{60}$ L. E. $+1\frac{1}{8} V. = \frac{20}{60}$
11	10 years	Alt. usually R. E. Conv.=3"	7 years	Acc. R. E. $+1\frac{1}{8} V. = \frac{20}{60}$ " L. E. $+1\frac{1}{8} V. = \frac{20}{60}$
12	14 years	Monoc. L.=2½"	11 years	+ { R. E. $+2\frac{1}{8} + \frac{1}{8}$, 60' At { V. = $\frac{20}{60}$ L. E. $+2\frac{1}{8} V. = \frac{20}{60}$
13	27 years	Alt. R. E. Squints more constantly = 2½"	16 years	R. E. V. = Quantitative light perception. Can not count fingers. L. E. $+1\frac{1}{8} V. = \frac{20}{60}$
14	13 years	Monoc. or R. E.=3"	5 years	V. R. E. counting fingers at 18" on temporal side only L. E. $+1\frac{1}{8} V. = \frac{20}{60}$ + { R. E. V. = fingers 30" At { L. $+2.75 = \frac{20}{60}$
15	6 years	Monoc. L. E.=2"	5 years	Acc. L. V. = fingers 4' + { R. $+4.00 = \frac{20}{60}$ At { L. E. V. = fingers 4'
16	14 years	Alt. Conv.=1½"		+ { R. $+4.00 = \frac{20}{60}$ At { L. $+4.50 + 1.00 = \frac{20}{60}$
17	6 years	Alt. Conv.=2"	Since aet 3 mos	+ { R. $+6.00 V. = \frac{20}{60}$ At { L. $+6.00 V. = \frac{20}{60}$

OPERATION UPON CONCOMITANT CONVERGENT STRABISMUS.

TREATMENT	TIME AND VISION AFTER OPERATION	REMARKS
Tenotomy R. and L. Int. Recti Spectacles	Eight months Acc. R. E. $+1\frac{1}{2}$ V. $=\frac{1}{5}$ L. E. $+1\frac{1}{2}$ V. $=\frac{1}{5}$	Central fixation possible with right eye.
Two operations on L. I. R. one on R. I. R.	In 17 months R. E. V. $=\frac{1}{10}$ L. E. V. $=\frac{1}{10}$	
Tenotomy both Internal Recti	Three months R. E. V. $=\frac{20}{100}=20$ J.	R. E. refuses any glass.
Tenotomy both Internal Recti and glasses	One year eight months R. E. V. $=\frac{1}{10}$ L. E. $=\frac{1}{10}$	Subject to fits in infancy. Sees double when she thinks of it. Homon. diplopia. Hyperphoria R. E. 4.
Operation L. I. Recti	One month R. E. $+4\frac{1}{2}$ V. $=\frac{1}{2}$ L. E. $+4\frac{1}{2}$ V. $=\frac{1}{2}$	
Operation R. and L. I. Recti	Three months R. or L. E. $+2\frac{1}{4}$ V. $=\frac{1}{10}$	
Operation R. I. Rectus	Six days R. E. $+1\frac{1}{4}$ V. $=\frac{1}{5}$ L. E. $+1\frac{1}{4}$ V. $=\frac{1}{5}$	
Operation R. and L. I. Recti	Two weeks R. E. $+2\frac{1}{2}$ V. $=\frac{1}{10}$ L. E. $+1\frac{1}{4}$ V. $=\frac{1}{10}$	
Tenotomy R. and L. I. Recti	Five months R. E. V. $=\frac{1}{10}$ L. E. V. $=\frac{1}{10}$	
Operation R. and L. I. Recti and glasses	Fourteen months R. E. $+1\frac{1}{4}$ V. $=\frac{20}{100}$ L. E. $+1\frac{1}{4}$ V. $=\frac{20}{100}$	
Operation R. and L. I. Recti and glasses	Two years 10 months R. E. $+1\frac{1}{8}$ V. $=\frac{20}{100}$ L. E. $+4\frac{1}{2}$ V. $=\frac{10}{100}$	
Tenotomy L. I. Rectus	Five months R. E. c. glass V. $=\frac{20}{100}$ L. E. c. glass V. $=\frac{20}{100}$	Had worn comp. glasses three years before first consulta- tion.
Tenotomy R. I. Rectus	After operation V. R. E. = fingers 1' One week after operation R. E. V. $=\frac{20}{100}$	Tenotomy R. and L. Int. Recti and advancement of R. E. Rectus one month after first operation. Five months later V. R. E. $=\frac{20}{100}$
Tenotomy R. I. Rectus and adv. R. E. Rectus, later tenotomy L. I. R. and adv. of Tenon's caps. over L. E. Rectus	Two years 9 months V. R. E. $=\frac{10}{100}$ V. L. E. $=\frac{10}{100}$	
Tenotomy L. I. R. and adv. of capsule over L. E. R. Sps.	Four months L. E. V. $=\frac{20}{100}$	Ophthal. examination R. disc. pale. Galv. to L. eye for six weeks; did not improve vision.
Operation R. I. R. and glasses, + 4.00	Ten months R. $=1\frac{1}{2}$ L. $=\frac{1}{2}$	
Operation R. and L. Int. Recti and Sps.	Two years 8 months R. E. + 6.00 V. $=\frac{10}{100}$ L. E. + 6.00 V. $=\frac{10}{100}$	

In eighteen eyes which showed subnormal vision on first examination, vision after operation remained the same in five, increased 25% in three, 50% in five, 100% in four, 300% in one. The great increase in vision in 13, 14 and 15 may allow special mention:

No. 13. Squint of sixteen years' duration. V. R. E. = Light perception. Cannot count fingers. L. E. $+ \frac{1}{12} = \frac{20}{20}$. After tenotomy R. E. the V = fingers 1'. One week later V = $\frac{6}{30}$.

No. 14. R. E. V. = fingers 18" (on temporal side only) under atropin = fingers 30". L. E. V. = $\frac{6}{9}$ $\frac{1}{2}$ glass. Tenotomy and advancement both eyes. Two years 8 mos. later V. R. E. = $\frac{6}{25}$.

No. 15. L. monoc. squint. V. = fingers 4' under atropin V. same. Tenotomy and glasses. In 4 mos. V. L. E. = $\frac{6}{30}$.

These three cases are too striking to be explained away by a charge of carelessness in the examination. In spite "of all temptation" to continue, the argument for amblyopia ex-anopsia and the reader (if he has toiled so far) may here rest.

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PURULENT INFLAMMATION OF THE EYEBALL AND
ORBITAL TISSUE, AND PARALYSIS OF THE
OCULAR MUSCLES AS POSSIBLE COM-
PLICATIONS OR SEQUELÆ OF
INFLUENZA.

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IN discussing the localized complications of any general systemic disease, and especially of any infectious disease, we should beware of regarding all that follows a disease as its direct effect. This is particularly true of the complex of symptoms which we call influenza, and the French "la grippe." Many of those attacked and weakened by influenza become, in consequence of this weakness, the victims of diseases which have no connection with the original cause of the weakness. The more closely we observe this disorder the more convinced we become that the sequelæ of influenza bear no relation to the severity of the primary disease. Another fact which has been made clear by the study and observations of cases of influenza is that the general number of eye diseases is not increased during the prevailing epidemic.

So far as we know there is no ocular complication or sequela of influenza which is at all characteristic of the disease. Affections of the eyes in influenza are relatively not infrequent. They are polymorphous, of multiple variety, and many of them slight in nature and easily relieved.

I think that it may be stated positively that no one specific infecting agent has been with certainty found in all cases of influenza. Among the bacteria found in the circulation, secretions or tissues of patients affected with influenza may be mentioned three varieties which are important from their consequences, viz: The diplococcus, streptococcus and staphylococcus pyogenes. All

these may induce embolic and thrombotic processes in any part of the body, and also give rise to true products which poison all the functions.

It scarcely seems necessary to call in question the credibility of the belief that purulent processes occurring in the eye are dependent upon the toxic products of influenza. The question, very naturally, however, arises: is the connection between the diseases of the eye and influenza direct or indirect, primary or secondary. Do toxic influences play the main rôle or do they merely lower the general health and thus pave the way for eye troubles?

The connection probably varies with different forms of eye disease. We start with the generally recognized assertion that influenza is an infectious disease in which capillary thrombosis have often been found. Emboli have been met with which are either infectious, or consist of simple clots. If they are infectious the streptococcus or the diplococcus or the staphylococcus pyogenes will be found. Many such cases have been reported in detail by the most careful observers, and there seems to be no reasonable doubt that purulent processes in the eye, the result in most cases of infectious embolism or thrombosis, are by no means infrequent complications or sequelæ of influenza. Of these the most important and the most disastrous in its consequences is the septic choroiditis or irido-choroiditis.

The most frequent purulent processes in the eye which accompany or follow influenza seem to be entirely external and are located in the lids, conjunctiva or cornea. In these cases Jaccoud has advanced the theory that the infection is intrinsic; that is, the numerous microbes of the conjunctiva, inoffensive when the patient is in good health, become noxious by the invasion of influenza. Fage, (*Archiv. d'ophtal.*, 1890, p. 316, et an deg), has reported cases of purulent dacryocystitis and abscess of the cornea with hypopyon. Landolt, (*Rec. d'Ophtal.*, 1890), has reported a case of abscess of the lid. Hosch, (*Correspondenzbl. f. Schweizer Aerzte*, 1890), reports a case of purulent irido-choroiditis with hypopyon. Eversbusch, (*Münch. Med. Woch.*, 1890), reports in detail an extremely interesting case of purulent choroiditis occurring on the ninth day of the influenza and ending in panophthalmitis and perforation. The staphylococcus pyogenes aureus was found in large numbers in the secretion, and infectious emboli were found in several of the blood vessels of the uveal tract. Fuchs, (*Wien. Kl. Woch.*, 1890), reports a case of purulent inflammation of the capsule of Tenon, beginning on the

fourth day of the influenza with exophthalmos, loss of motility, swollen lids, and eventually a discharge of pus by two openings into the orbital tissue, and the pus showed pneumococci. Gazis (*Rec. d'Ophtal.*, 1890) reports a similar case. Ehrlich (*Inaug. Diss. Berlin*, 1892) reports a case of abscess of Tenon's capsule, one of purulent orbital cellulitis, one of abscess of the lid, and one of purulent dacryocystitis. Laqueur (*Berl. Kl. Woch.*, 1890) describes a case of bilateral embolic iridocyclitis which came on suddenly on the eighth day of the disease and ended in complete blindness of both eyes which lasted four days. The patient subsequently regained a vision of one-half. Natauson (*Petersb. Med. Woch.*, 1890) reports a case of influenza with pleuro-pneumonia and bilateral embolic irido-choroiditis ending in total blindness on the third day, and death on the fifth day. Finally in the monograph by Leyden and Guttmann on the influenza epidemic of 1889 and 1890, Horstmann, who wrote the chapter on affections of the eye, refers to cases by Pflueger, Greeff, Lyder, Borthem and himself, showing the great variety of suppurative processes in the eye met with in patients sick with influenza.

Among a number of cases of purulent diseases of the eye in patients suffering from influenza during the last three years which I have seen, the following recent case seems worth reporting in detail, on account of its severity and fatal termination.

On January 28, 1895, a woman, 40 years of age, was brought to me suffering from a very severe type of orbital cellulitis and panophthalmitis, and she gave the following history: The right eye had been blind for many years from a traumatism.

On January 23, she was attacked by many of the symptoms of influenza, coryza, obstinate cough, severe headache, high fever, pain in all her bones, and on the next day the eyelids began to swell and the eye to protrude. These symptoms rapidly grew worse, and when I saw her on the fifth day the eyelids were enormously swollen, the exophthalmos was extreme, the eyeball was very hard and immovable, and the pain was intense. Her temperature was $103\frac{2}{5}$; her cough was violent and the expectoration profuse. She was put to bed, hot bichlorid fomentations were applied, leeches to the temple were ordered, and phenacetin and morphia were given to take down her temperature and allay the pain. The applications were continued for three weeks before the signs of cellulitis and panophthalmitis entirely subsided. As soon as softening began, two incisions were made into the orbital tissue on both sides of the eyeball, and the pus then discharged freely.

The cornea had previously ruptured, and a large amount of detritus and pus was evacuated from the eyeball. After all signs of cellulitis had subsided and pus had ceased to be discharged from the orbital tissue, the eyeball was carefully enucleated, and a clean, apparently healthy cavity was left. On the evening of the second day after the enucleation, the wound appearing perfectly healthy, she began to develop symptoms of meningitis, and she died comatose on the fourth day. The autopsy showed purulent meningitis which involved not only the whole base of the brain, but also the entire convexity as well. The extensive character of the meningeal inflammation led me almost to suspect that the meningitis had begun before the enucleation was done. At the autopsy no pus was found anywhere in the sheath of the optic nerve, but a subsequent microscopic examination may give a different finding. There seems scarcely any doubt that this was an embolic process, whether starting in the cellular tissue of the orbit or in the uveal tract, it would seem impossible to say.

In regard to the affections of the nervous apparatus of the eye which are said to complicate or follow the influenza, including the muscles, the retina and the optic nerve, the cases reported by competent observers are even more numerous than the cases of suppurative disease, and their actual connection with the general disease cannot be denied. The most frequent of these nervous sequelæ is probably a paralysis of accommodation. Here the toxic agent of influenza resembles that of diphtheria. Then we meet, in the order of frequency, with paralysis of the sixth or abducens nerve; paralysis of the motor oculi or third nerve, and paralysis of the trochlearis or fourth nerve. The muscles supplied by the third, fourth or sixth nerves may be individually affected, or there may be complete external and internal ophthalmoplegia, either unilateral or bilateral. The paralysis of accommodation may occur alone without paralysis of the sphincter iridis, and in this peculiar effect the influenza resembles diphtheria. Three such instances have come under my own notice, and all regained the lost power of accommodation.

Schirmer (*Klin. Mon. f. Aug.*, 1890) reports a case of right unilateral complete ophthalmoplegia, coming on during the height of an attack of influenza. There was loss of sensibility on the right side of the face and scalp, with paresis of the right masseter and temporalis muscles, and also of the muscles of the tongue on the same side. As there was paralysis of the third, fourth, fifth, sixth and seventh nerves, the lesion must have been

central, and was possibly a hemorrhage at the base of the skull, in or near the middle fossa. It is a well-known fact that in many cases of influenza there is a strong tendency to hemorrhage in various regions of the body.

Affections of the retina and optic nerve have been found to be almost as frequent complications of influenza as are paralyses of the ocular muscles, but they seem to be divided into two classes: one which accompanies the attack of influenza, and another which is a pure sequela, coming on several weeks after the onset of the disease. It is more obstinate in resisting treatment and leaves more disastrous results as to vision than the first class, because there is not only inflammation of the sheath of the optic nerve, but also acute degeneration of the nerve fibers. The papillitis or retrobulbar neuritis met with during or after the attack of influenza resemble the same conditions met with in the course of other infectious diseases. Two interesting cases are reported by Landsberg (*Centralbl. f. prakt. Aug.*, 1890). The first was a man, who, on the fourteenth day of the influenza, suddenly lost the sight of his left eye, without any ophthalmoscopic evidence of disease. He could count fingers at two feet, had a very narrow field with total color-blindness, and regained his vision after eleven daily injections of pilocarpin. The other case was a woman who, during convalescence from influenza, had a sudden failure of vision of the left eye, with a central scotoma, proving the presence of a neuritis of the macular fibers, as the ophthalmoscopic examination was negative. She recovered under the administration of strychnia.

Ehrlich (*Inaug. Diss.*, Berlin, 1892) reports cases of retrobulbar neuritis and papillitis, and Antonelli (*Annali di Ottal.*, XXI, p. 119) the same. Snell (*Trans. Ophthal. Soc. United Kingdom*, 1892) describes cases of optic neuritis ending in atrophy. Hart-ridge (*idem*, 1892) reports a case of bilateral neuro-retinitis, and Métozas (*Annales d'Oc.*, May, 1892) a case of retrobulbar neuritis, with hemeralopia, ending in atrophy.

Remak (*Centralbl. f. prakt. Aug.*, 1890) reports a case of a man, with a severe catarrhal form of influenza, who, on the fourth day had a series of four convulsions within one hour, followed by loss of vision and atrophy of the optic nerves.

Bergmeister reports cases of simple and inflammatory atrophy of the optic nerve, with concentric limitation of the field of vision and loss of the color sense.

Graddy (*Ophth. Rec.*, June, 1892) reports an interesting case of a woman who had a severe attack of influenza with pulmonary complications, and in the third week became suddenly blind, with a very small area of central vision for light. From this condition there was a slow improvement, followed again on the twelfth day by sudden failure of the vision, and right bilateral hemianopsia, which remained permanently.

Gifford (*Ophth. Rec.*, 1892) reports the case of a man who, during a severe attack of influenza, suddenly had an onset of violent pain in the occipital region, followed by bilateral right-sided hemianopsia. In each eye the line of demarcation followed the vertical meridian accurately and remained unchanged for nearly three years.

The writer has recently had under his care the following case: A gentleman, 62 years of age, a literary man, badly nourished, and a victim for many years to intestinal catarrh, on the fourth day of a severe attack of influenza, suddenly noticed an obscuration of the vision of the right eye. I saw him within a few hours of the occurrence, found a central scotoma, positive in character, with a diameter of about 30° in all directions from the center of the field. Within the limits of the scotoma vision was absolutely lost. The ophthalmoscopic examination was entirely negative and has remained so. The scotoma for form gradually grew smaller and eventually disappeared, but the sense for color is still absent within the limits of the original scotoma. There was no pain caused by movements of the eye in the orbit, but considerable pain was produced by pressing the eye backwards into the orbit. He recovered under the use of strychnia and pilocarpin administered hypodermatically. This was undoubtedly a case of retrobulbar neuritis, the fibers going to the region of the macula being involved.

AN ANOMALOUS CASE OF INTERSTITIAL
KERATITIS.BY ROBERT R. SAUNDERS, M. D.,
OF PHILADELPHIA.

THE patient, R. H., 19 years of age, presented himself to me for treatment August 13, 1894, complaining of "a cloud," as he called it, that had come over the sight of his left eye. He also complained of intense fronto-temporal headaches along with lassitude, diarrhea and feverishness. On closer inquiry I found that he had had diarrhea for about four days, and that he had been feeling badly for three or four weeks; his temperature when I first saw him was $102\frac{2}{5}^{\circ}$. In short, he had every symptom of typhoid fever. The cornea of the left eye was found to be densely infiltrated in the outer part of the lower and outer quadrant, and numerous infiltrated spots were found in its immediate neighborhood. There was not a sign of circumcorneal injection whatever, nor was there any throughout the history of the case. The vision in O. D. = $\frac{5}{8}$, O. S. = $\frac{2}{3}$. I told the patient that he had typhoid fever and directed him to go home and send for his physician, which he did. His physician confirmed my diagnosis and treated him. On September 17 I saw the patient again and found the vision in O. S. = fingers at 5 inches; the infiltration had shifted to the center of the cornea and the edges were clearing up rapidly. There was no circumcorneal injection. Saw the patient again October 1, and found the opacity lessening very much and vision improving. After this I lost sight of my patient, but heard that he subsequently had gotten some vision in the eye. There was no history of syphilis inherited or acquired and his teeth were not of the Hutchinson's type. Was it typhoid that caused the keratitis?

309 South Fifteenth Street.

FOREIGN BODY IN SCLERA FOR THIRTEEN YEARS.

BY FRANK W. RING, M. D.,
OF NEW YORK.

WE not infrequently hear of foreign bodies remaining in the eye ball for a much longer period, without causing any disturbance, but for one to remain in the sclera, without penetrating and its presence unknown to the patient is rather remarkable.

January 28, 1895, John Gallagher, 22 years of age, came to the Manhattan Eye and Ear Hospital with a foreign body protruding from the sub-conjunctival tissue, 10 mm from the cornea, temporal side, left eye. It was easily removed with the forceps, and found to be a *black thorn* 4 mm. in length and 1 mm at its base. The ophthalmoscope showed a perfectly normal interior with a vision of $\frac{20}{40}$.

History: Thirteen years ago, when a lad of 9, he was running through the bushes and this thorn pierced the sclera; the wound bled somewhat, but caused no particular inconvenience. It became imbedded in the sclera and was not visible. Five days ago closing of the lid gave him pain, and soon the thorn appeared base first through the tissue. It was rather remarkable that it should have been thirteen years working its way out.

101 Park avenue.

ABSTRACTS FROM FOREIGN OPHTHALMIC JOURNALS.

By CASEY A. WOOD, M. D.,
OF CHICAGO.

SALICYLATE OF SODIUM IN THE TREATMENT OF EXOPHTHALMIC GOITRE—THE PART PLAYED BY ASTIGMATISM IN THE CAUSATION OF CATARACT—PARESIS OF ACCOMODATION FOLLOWING DIPHTHERIA TREATED BY BEHRING'S "HEILSERUM"—SPONTANEOUS HEMORRHAGE (BLOODY TEARS) FROM THE CONJUNCTIVA—TATTOOING THE CORNEA FOR THE PURPOSE OF IMPROVING VISION—PARALYSIS OF BOTH EXTERNAL RECTI FOLLOWING DIPHTHERIA—A CASE OF "CHALKOSIS RETINÆ" (GOLDZIEHER).

The oculist may fairly lay claim to Basedow's disease as his own for the simple reason that he is the one frequently called upon to treat its most notable symptom. Unfortunately he is usually unable to do anything effective for his patient. Chibret¹ gives the following history of four cases in which he employed sodic salicylate with decided effect.

The first is that of an unmarried woman, 44 years of age, with the three classical symptoms well marked: exophthalmos, goitre and tachycardia. The salicylate was administered in doses of $1\frac{1}{4}$ gram four times a day, and at the end of four days there was a considerable amelioration of the symptoms. This improvement was maintained as long as the medication was kept up. Patient disappeared after five months.

A man, 42 years of age, with the same well known symptoms, was troubled so much with the rapid beatings of his heart that he could not sleep and was unable to make the slightest exertion. Even easy walking induced a state approaching asphyxia and brought on profuse perspiration. Five grams of sodic salicylate daily in divided doses gave him much relief in six days. While taking this treatment he was able to work in the fields, which he did for the space of a month. This result was particularly satis-

¹ Le salicylate de soude dans le goitre exophtalmique. *Revue générale d'ophtalmologie*, Jan., 1895, p. 1.

factory when we remember how grave a disease this is in so many instances.

The next case was carefully watched for two years. A woman, 38 years of age, had exophthalmos, rapid pulse, and slight goitre, with edema of the whole of the right side of the body. This was relieved by the salicylate after three days, and on further treatment the improvement continued. The trouble at first recurred when the medicine was stopped, but after a year's treatment the patient is beginning to get along without the salicylate; she now takes it only when, owing to an emotional attack, fatigue, cold, etc., she feels she may have a return of the trouble.

A woman, 40 years of age, applied for treatment in January, 1891. She had the usual signs of exophthalmic goitre. The salicylate of sodium relieved her almost immediately and as long as she continued to take it she did not suffer, although her surroundings were such as to favor a perpetuation of the disease.

The progress of Basedow's disease closely resembles that of gout. If the oculist carefully interrogates the patient and inquires into his family history he will nearly always find that the subject of exophthalmic goitre has had arthritic disease, either hereditary or acquired. This was the reason why the author tried sodic salicylate in these cases and he thinks there is no other gouty affection that so readily improves under this treatment.

The writer regrets that his experience has been confined to four cases, but thinks he might publish it, because to wait until he had seen a large number of examples of this rare disease would be to defer it indefinitely.

The remedy is a very unpopular one with the public. When taken without proper precautions its effects are often unpleasant. Chibret advises that the daily quantity be divided into four parts and given in at least half a liter of liquid. In this form it does not produce disagreeable effects even in cases of intolerance. If the patient refuses to take the full dose (5 grams), the daily amount may be reduced. Anyone can take without discomfort 2 grms. in the twenty-four hours.

THE RELATIONS OF ASTIGMATISM AND CATARACT.

Dr. Roure² thinks that in spite of numerous publications on this subject, the pathogenesis of cataract is still obscure. Aside from

² Du rôle de l'astigmatisme dans la genèse de la cataracte. *Archives d'ophtalmologie*, Jan., 1895, page 44.

such well known causes as traumatism, disease of the bulbar envelopes and such general diseases as diabetes, phosphaturia, atheroma, etc., not much is known about it. Vacher and Georges Martin have investigated the relations of cataract and astigmatism, but their results do not agree. While Vacher found astigmatism to be a common condition in the eyes of persons affected with cataract and believes that the anomaly has a marked effect in the production of the opacity in the lens, Martin does not so regard it.

The investigations pursued by the writer, in his attempt to throw further light on this subject, were made upon thirty-three cases of double cataract. No case was chosen where the astigmatism had resulted from injury or from surgical interference. The astigmatism was measured by the ophthalmometer. Among the conclusions arrived at were the following: (1) *That in twenty-five cases of double cataract, where both eyes were astigmatic, the eye with the higher degree of astigmatism was the first affected.* (2) *In five cases the lens of the eye having the lower degree of astigmatism first showed opacities.* Of the remaining eight cases there was no astigmatism or the anomaly was equal in each eye. (3) *In three of these cases the patient was not able to say which eye was first affected, i. e., the cataract probably appeared at the same time in each eye.*

It seems probable that the degree of the astigmatism exerts considerable influence over the time of life at which cataract appears. Thus it was found (4) *that the average age at which those eyes having from 0 to 0.50 D. of As. became cataractous was 62.4 years; from 0.75 to 1.50 D., 59.7 years, and from 1.75 to 2.75 D., 50.8 years.*

In spite of these figures Roure agrees with Martin that astigmatism cannot, *per se*, be regarded as a cause of cataract. In the sixty-six eyes examined, eleven, or 16.6%, showed no astigmatism. Martin's figures were 13.9% and Nordenson's 9.2%. (5) *Astigmatism cannot be regarded as a cause of cataract, but rather as a condition that favors its development when the unknown agent that produces the opacity is present.*

PARESIS OF ACCOMMODATION FOLLOWING DIPHTHERIA TREATED BY BEHRING'S HEILSERUM.

The reporter³ furnishes histories of three cases of ciliary paresis treated by Behring's diphtheria "heilserum;" two of which were

³Schmidt-Rimpler. Accommodations-Paresen mit Behring'schem Diphtherie-Heilserum. *Centralblatt für pht. Augenheilkunde*, Dec., 1894, p. 353.

probably the result of diphtheria while the third certainly was. The injections (a bottle of No. 1) were made beneath the skin of the chest with an ordinary hypodermic syringe and were not followed by any general symptoms. Whether the rather rapid disappearance of the accommodative paralysis in cases I and II was due to the remedy or not may be open to doubt, but it was certainly unusual. The improvement in speech also seemed remarkable. The writer thinks that further experiments will be required to determine its value in these cases. He thinks that it ought to be used in cases of conjunctival diphtheria, primary as well as secondary.

Case I. Boy, 9 years of age, had diphtheria the beginning of September and was fourteen days in bed. Had defect in speech and could not see well close at hand.

October 16. There was bilateral paresis of accommodation; H. 0.50, V. = $\frac{8}{8}$; papillary reaction normal; soft palate and uvula hang vertically. Patient chokes on drinking; speaks with a hoarse voice and cannot be easily understood. One injection of the serum.

October 18. Speech clearer; no choking during drinking.

October 20. Speech about normal. *The accommodative range widened until on October 29th it was normal.*

Case II. A boy, 10 years of age, had four weeks previously diphtheria and had been in bed until eight days before examination of his eyes.

October 20. *Strabismus concomitans oculi sinistr.* Right eye, H. = 2.5 D., V. = $\frac{8}{16}$; left eye, H. of 2.0 D., V. = $\frac{8}{8}$. Paresis of accommodation. Papillary reaction good. R. A. = 7.5. Fluids ejected through nose on attempting to drink. Uvula hangs to left. Speech rather hoarse. Injection of the Behring serum.

October 22. R. A. = 9.5. Uvula is now pretty straight. Speech the same.

October 24. Speech normal; no more choking.

October 29. A. = 12.5. Uvula very little out of the perpendicular.

Case III. Man, 24 years of age, seen on August 28.

October 14. He had hoarseness and dryness in his throat.

October 17. Some slight pain in the same place; increased on swallowing. He now began to suffer from pains in the stomach, and loss of appetite, could not take solid food and had to subsist on milk. Patient says he found he could not see well near by since he became ill and that he was unable to read ordinary print

since the 20th. The uvula was thickened, covered with a gray-brown exudation while the remaining parts of the pharynx were reddened and swollen. The examination showed, apart from this, nothing abnormal. The defect in vision is due to an accommodative paresis. A. = 3.5 D. In either eye there is 1. D. of H. which, when corrected, gives full visual acuity. In the beginning this patient was given general tonic treatment and a salt water gargle.

September 2. A subcutaneous injection of the heilserum.

September 9. A. = 5. D.

September 12. Amplitude of A. the same.

September 17. A. = 6. D.

September 20. A. = 7.5 D.

September 24. A. = 9. D. Discharged in good condition.

SPONTANEOUS HEMORRHAGE (BLOODY TEARS) FROM THE CONJUNCTIVA.

The writer⁴ gives an account of this rather rare symptom (shedding tears of blood) which has at various times been referred to in literature and as often attributed to causes entirely remote from the organ of vision.

His own case was as follows: A woman, about 50 years of age, came to him complaining that her left eye was frequently bathed in bloody tears. The eyes seemed to be normal and the bulbar conjunctiva was apparently healthy. But on everting the left upper lid there appeared at the upper and outer margin of the tarsus a small sessile tumor $2\frac{1}{2}$ mm. long by $1\frac{1}{2}$ mm. wide. Touched with a probe it immediately began to bleed profusely. The patient then told how on awakening she sometimes found her face and ear smeared with blood.

Compression did not stop the bleeding so the whole tumor was destroyed by the galvano-cautery. The writer quotes Galezowski as saying that Forestier, Havers and Hassner have reported cases, but that they are very rare. The last named author speaks of an example in a woman suffering from irregular menstruation. According to him the bleeding was vicarious and occurred by transudation into the glandular vesicles. Galezowski has always found in such cases small subconjunctival abscesses or cysts whose mucous surfaces were rough, irregular and easily made to bleed. He advises that the palpebral conjunctiva and the retro-tarsal folds be carefully examined in all such cases.

⁴F. Matthieu. Pseudo-hémorrhagie spontanée de la conjunctivie. *Recueil d'ophtalmologie*, Jan., 1895.

In the instance under discussion the tumor seemed to be a papilloma which had undergone an angiomatous transformation. This was all the more likely as there were some five or six warty growths in the palpebral neighborhood—a coincidence commonly observed in papilloma conjunctivæ.

TATTOOING THE CORNEA FOR THE PURPOSE OF IMPROVING VISION.

Tattooing the cornea⁵ as a means of improving the vision although not a new procedure might, with signal advantage, be used more frequently than it is. In other words, the ophthalmic surgeon may, to advantage, imitate the "pin hole" obturator by a skillful use of the method.

Among the cases where this has been carried out with success is the following by Landau: A man, 28 years of age, came to him on account of defective vision in his right eye, that had suffered two months before from a tedious and very severe inflammatory attack. The eye was then quiet and free from signs of congestion, but there was a large white rectangular opacity with irregular cloudy edges covering fully the lower three-fourths of the pupillary area and reaching to the limbus cornea. Towards the temporal border there were slight anterior synechiæ. V. = $\frac{1}{80}$; with + 6. D., Sn. $3\frac{1}{2}$ was read at four inches. Tension and F. of V. normal. Patient was advised to have an iridectomy performed after the cornea had been tattooed.

October 9. The whole scar was well blackened in one sitting, care being taken to avoid the incarcerated iris. Four days afterwards the cornea had healed, was smooth, black and shiny.

October 30. Distant vision had improved to $\frac{1}{8}$ or $\frac{1}{10}$ and Sn. $1\frac{1}{2}$ was easily read at six to seven inches. This remarkable improvement in vision by simply tattooing the cornea made the propriety of an iridectomy at least doubtful.

The tattooing was carried out after the plan of Liebrecht, the needle being carried *obliquely under the surface of the scar*, and the coloring matter allowed to flow into the opening; or the same purpose accomplished with a small hypodermic syringe. Thus in one sitting even a large scar can be successfully colored, the limits of the tattooing regulated, and the cloudy edge of the cicatrix sufficiently blackened. Hirschberg has always taught that when

⁵Otto Landau. Hornhautfärbung zur Verbesserung der Sehschärfe *Centralb. für phth. Augenheilkunde*, Jan., 1895, p. 10.

only a very small portion of the natural pupil is unaffected by a scar better vision can be obtained by judicious tattooing than by iridectomy.

PARALYSIS OF BOTH EXTERNAL RECTI FOLLOWING DIPHTHERIA.

Heintz⁶ presents the following interesting and rare example of post-diphtheritic paralysis of both external recti without any accompanying affection of accommodation. It resembles very closely a somewhat similar case reported by Harry Friedenwald in the *Medical News* for October, 1893. A boy, 7 years of age, was perfectly healthy until the end of September, 1893, when he contracted diphtheria which affected the post-nasal space. About three weeks afterwards the parents consulted a specialist on account of difficulty of swallowing and nasal intonation in speaking. This was accompanied by a marked paresis of the palatal muscles. All these symptoms improved under treatment so that by the end of October he was able to go to school.

November 6. The patient suddenly began to complain of his eyes, especially of double vision and dizziness, while his parents and teacher noticed that he had begun to squint.

November 10. The author examined him and found both eyes emmetropic with normal V. for both distance and near. The pupillary reaction was normal. There was alternating convergent strabismus, *i. e.*, in looking to the right, fixation was accomplished with the left eye; in looking to the left, with the right eye. In looking straight forward at an object 8 m. distant there was *homonymous* diplopia, the images standing well apart.

Nothing but hygienic measures were employed in the case.

November 20. There were no traces of the squint, and double images were seen only when the patient looked to the extreme right or left. He was able to resume his school work and even to read without difficulty. The latent convergence for the near (30 cm.) measured 2°, for the distance 6°; right the same as left.

November 29. Latent convergence for near and distance was 2° and 5°. Looking to the extreme right developed a homonymous diplopia at 8 m., but there were no double images toward the extreme left.

February 28. Adduction was 44°, abduction 6°, diplopia only when patient looked towards the extreme right.

⁶E. Heintz. Ueber einen Fall von doppelseitiger Abducens-parese nach Diphtherie ohne weitere Augenstörung. *Centralblatt für prakt. Augenheilkunde*, February, 1895, p. 33.

It is highly probable that this is a case of diphtheritic paresis of both externi without implication of the ciliary muscle. It is unlikely that the accommodation could have been affected early and then recovered before an examination had been made of his eyes because the boy had, while in school and previous to seeing the oculist, been noticed to hold his book nearer to his eyes than usual.

A CASE OF CHALKOSIS RETINÆ (GOLDZIEHER).

The writer⁷ is impelled to report this case by the discussion at the last meeting of the International Ophthalmological Congress of Leber's paper on injuries to the eye from pieces of copper. A man, 18 years of age, had for ten years a piece of copper imbedded in the retina. It can now be made out by proper illumination even without the ophthalmoscope. The writer once more carefully examined the patient before reporting the case and believes that the description about to be given is absolutely correct, and that little or no change has taken place in the fundus appearance for almost a year at least.

The left eye is somewhat myopic, but has full visual acuity and is otherwise healthy. The right eye has a disc-like and very faint cloudiness of the anterior lenticular capsule, covering the pupillary area. A little to the temporal side of this there is another smaller opacity situated in the anterior layer of the lens substance. Cornea and iris are normal and there is no trace of posterior synechiæ. On dilating the pupil, if the examiner looks into the eye when it is well illuminated he will see from the depths of the fundus a well marked metallic, red reflex. The lens is perfectly transparent except at the points above mentioned. In the vitreous are several punctiform as well as a number of large floating opacities, but all the details of the fundus can be readily made out. The papilla and retinal vessels are normal. Beginning about half a disc diameter from the temporal margin of the nerve-head and including the macular region is a number of remarkable lesions. The retina in the space indicated is filled with innumerable glistening spots or stipplings, of a bright orange or red color. These are joined to one another by small lines. They resemble, in the words of the writer, the microscopic network of

⁷Ueber den Fall eines seit 10 Jahren in der Netzhaut verweilenden Kupfersplitters, nebst Bemerkungen über Imprägnation der Netzhaut mit Kupfer (Chalkosis retinæ). *Centralblatt für prakt. Augenheilkunde*, Jan., 1895, p. 1.

cells which is brought out when the cornea is stained with nitrate of silver. These plaques lie in the anterior layers of the retina under the large superficial vessels, which latter appear to be entirely normal. They show no trace of pigment cells and are evidently not connected with the choroid. About the region where the macula lutea should be, and evidently penetrating the ocular coats in a slanting direction, is a thin, long body with its end raised above the plane of the retina. On moving the head or mirror to and fro this object and the surrounding retina give a visual sensation exactly like metallic luster.

The patient gives a history of having been exposed ten years before to the explosion of a percussion cap which had wounded him in the eye, and that he was treated for it for some time. Strange to say, in the injured eye V. = $\frac{3}{8}$, almost; there is M. of 2. D. and the patient can read small text.

It is probable that the thin piece of copper entered the cornea in such a way as to leave no trace and penetrated to the macular region, causing the minimum amount of injury. That copper fragments may remain in the eye for many years without producing any irritation is well established. That this is due to the fact of their being aseptic is also well known. The remarkable change produced by the fragment under consideration is probably chiefly a chemical one—the impregnation of the surrounding retina with some form of copper, probably with the oxide. It is possible, also that the visual purple might enter into such a compound. Whatever be the exact nature of the glistening metallic compound thus formed in the retina the writer proposes for it the name *chalkosis retinae*.

ABSTRACTS FROM CURRENT AMERICAN AND ENGLISH OPHTHALMIC LITERATURE.

BY CHARLES H. MAY, M. D.,
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HINTS CONCERNING THE PERFORMANCE OF THE OPERATION FOR THE EXTRACTION OF SENILE CATARACT, BEING A RECORD OF PERSONAL EXPERIENCE.

Hasket Derby, M. D., Boston (*The Boston Medical and Surgical Journal*, January 31, 1895.) Dr. Hasket Derby was led to present this record of his personal experience by the appearance of Dr. Hermann Pagenstecher's recent excellent and instructive article entitled "Practical Advice to Young Ophthalmic Surgeons in regard to the Operation for Cataract" (*Monatsbl. f. Augenheilk.*, November, 1894. The paper embodies the convictions of thirty years of practical experience. The following are some of the most important paragraphs:

"It is my intention to discuss the best manner of restoring useful vision to the subjects of senile cataract. Confining, then, our study to this class of cases, I start with two axioms. The first, that no operation is to be done on one eye as long as the lens of the other is wholly transparent; the second, that, save in most exceptional cases, entire maturity is to be awaited."

"In regard to maturity, much is said at the present day concerning the possibility of the extraction of the lens, particularly in the case of aged people, in almost any state of opacity; nay, the removal of the transparent crystalline is seriously proposed as a remedy for extreme myopia. My own experience leads me to believe that the absence of perfect ripeness invariably diminishes the chances of success, in many cases complicates convalescence, and always renders the satisfactory performance of the operation more difficult. Of course there are occasions on which, of two evils, the lesser must be preferred, and times when it is better to encounter the risk of removing a cataract that is not wholly ripe than to leave an aged patient, who has wholly lost the power of reading and writing, to the depressing effect of forced idleness."

"The matter of prognosis is one on which the surgeon is invariably approached, one of the first questions put by the patient or his friends being as to the chances of success. It may safely be stated that, in an uncomplicated case of mature senile cataract occurring in a reasonably healthy patient under or not much past 85, when the cornea is fairly large, the pupil readily dilatable and the conjunctiva as well as the lachrymal apparatus free from disease, the chances of regaining useful vision are at least 85 per cent, while those of total loss of the eye may be estimated at 2 per cent. Where the above conditions are fulfilled this certainly agrees with my own experience. We operate, however, in many instances where they are not, and no law as to the effect of complications on an ultimate success can be formulated."

"*Shall iridectomy be performed or not?* This is the burning question of the present day. In favor of leaving the iris intact may be mentioned the lessened operative interference with the eye, there being but one wound to heal instead of two, the cosmetic effect of a round central pupil, and the protection afforded by its spontaneous dilatation and contraction. Against simple extraction are to be alleged the increased difficulty in removing cortical substance that may remain behind from the pupillary area, and the great danger of prolapse of the iris. And, in consideration of this, I see no reason for departing from the belief I have always entertained that the average patient at the hands of the average surgeon stands a better chance of an uncomplicated recovery, and in consequence thereof of attaining useful vision, if iridectomy be performed. It is true that great and practiced operators obtain excellent results in the vast majority of cases from simple extraction, and that many of them at this time are inclined to make it the rule and the combined operation the exception. But even they must accept the fact that no amount of experience in selecting cases, or of manual dexterity in operating, can enable the surgeon to declare that in any given case iris-prolapse may not occur. In a series of a hundred attempted simple extractions it will be found that six or eight iridectomies have to be done after the removal of the lens, on account of the difficulty experienced in maintaining reposition of the iris. And the performance of iridectomy at this stage is always a delicate and most difficult proceeding. And in from eight to ten other cases, out of the same hundred, iris-prolapse takes place under the bandage, owing to some sudden motion of the patient or without assignable cause."

"If this is the experience of the older surgeons, what might be that of the beginner? I maintain, therefore, that the young practitioner will do well to combine iridectomy with extraction."

"The cut is made at the sclero-corneal junction and should extend over one-third of the periphery of the cornea, being crescentic in shape. Pagenstecher, whose view as to the cut I have here reproduced, advocates the formation of a conjunctival flap, from which I wholly dissent. He has already dwelt on the advantage of eliminating a second wound in the shape of an iridectomy, and yet he now advises the infliction of one much larger and more external, involving a relatively large healing area. It has ever been my practice, on completing the corneal cut, to turn the blade of the knife forward and cut out as rapidly as possible, fixation being at once and finally desisted from."

"The capsule is to be thoroughly incised in different directions with the cycotome. I see no advantage in the peripheric opening advised by some writers."

"The irrigation of the anterior chamber for cleansing purposes is a difficult and delicate proceeding, and, although in the hands of experienced operators it may sometimes be productive of good results, it is never to be advised the beginner, who had better run the risk of allowing a small amount of lens matter to absorb than follow a method the results of which are sometimes so harmful."

"Should vitreous escape before the lens is removed, and especially if the latter shows a tendency to become dislocated backward or downward, the scoop (preferably that of Bowman) should be at once introduced and the lens extracted. As this is a contingency that may at any time occur, it is well to have the scoop in readiness and thoroughly disinfected before commencing the operation."

"After the removal of the lens and the clearing of the pupil, the rubber spatula is to be passed into each corner of the wound to free any fragment of iris or capsule that may have lodged there. A drop of a 1 per cent solution of eserine instilled into the conjunctival sac before closing the eye tends to withdraw the iris from the wound and thus prevents prolapse. A sterilized bandage is then to be applied."

"I always endeavor to operate in the early morning; it is my custom to visit the patient again late in the afternoon and change the bandage, washing the outside of the eye with sterilized cotton dipped in sterilized water, but not separating the lids. This is repeated hereafter once a day until the eighth day, when I make my first examination of the eyeball."

"Of course, the rule is not invariable; there are cases where the skin will not so long support the irritation of continued pressure and requires earlier exposure to the air. And where pain, swelling, lachrymation and discharge warn us that the normal healing process is not going on, an immediate examination must be made."

"In order to secure dilatation of the pupil I frequently wet with the usual solution of atropin the small piece of linen that is placed directly on the eye and serves to prevent fragments of lint from getting in between the lids. This is done daily for several days previous to opening the eye, and is found in the majority of cases to affect the pupil. It is especially desirable to do this in cases where cortical substance is known to have been left behind."

"In regard to the claim that after the operation of extraction only one eye need be guarded, the lids being lightly closed with plaster; that the patient may be allowed to remain in a light room, and even to use the other eye, it may be replied that undoubtedly some eyes recover under these or even more unfavorable conditions, and that accurate and extended statistics must be substituted for vague assertion before the average surgeon will be justified in so serious a departure from precautions which have stood the test of long experience."

"I seldom find it necessary to confine the patient to the bed more than twenty-four hours. On the afternoon of the operation a bed-rest may be used under the shoulders and a half-sitting position indulged in, a change always productive of much relief. After dressing the eye the following morning the patient is allowed to leave the bed and occupy an easy chair, wearing a loose wrapper. On the third day the ordinary clothing may be resumed and a walk up and down the entry allowed, an attendant being of course at hand. A mild form of mania that occurs with some old people a few days after the operation is largely due to the combined effect of darkness and solitude."

"Such an article as the present might be almost indefinitely prolonged. It is a record of personal experience and is to be taken for what it is worth. I have seen flap extraction with the triangular knife, the operation generally practiced during my student days, modified later by previous iridectomy, entirely superseded by the methods of Graefe, this in its turn reinforced by anesthesia and asepsis, as well as changed in various details. In the face of such mutation, occurring during the life of a single individual, it is not improbable that we are on the threshold of even greater changes, and that the teachings given in the present article will before long offer a simply historical interest."

REMOVAL OF THE LENS FOR HIGH MYOPIA.

Mr. C. Wray, (*Medical Press*, February 13, 1895). Report of the meeting of the Ophthalmological Society of the United Kingdom, January 31, 1895. Mr. Wray considered it settled that the removal of the lens for myopia of high degree was not applicable in children with less than 10 D. or in adults with less than 12 D. myopia. The objects of the operation were: (1) To prevent detachment of retina, (2) to arrest or prevent retino-chorioidal changes, and (3) to enable patients with the highest grades of myopia to work at reading distances if unable to do so. He had collected statistics of 123 patients with 246 eyes. In 38 cases, including 3 of detached retina, the patients had vision less than $\frac{6}{80}$ in one eye, while 10 had vision less than $\frac{6}{80}$ in both eyes. These figures admitted of three deductions: (1) That vision is invariably less in the fourth decade than in the third; (2) that the retinal detachment was less to be feared than the changes in the chorioid and retina, and (3) that it was not necessary to regard every myope of 12 D. and upward as hopelessly drifting towards detachment of the retina and blindness. He had seen a case of retinal detachment after the removal of a lens in a case of myopia of 30 D., and he considered that detachment was comparatively frequent after the operation. In Parinaud's case the removal of the lens was not followed by prevention of the myopia, and he considered the operation a success if it prevented progressive changes in the fundus, and enabled patients to work at reading distance when unable to do so before with glasses. In myopia of low degree associated with zonular cataract the crescent was at times out of all proportion to the amount of myopia, and he presumed that this was due to amblyopia, and on that conviction it was a common thing to remove zonulars when patients could see $\frac{6}{24}$ and J. 4. It was a matter for regret that the hospital reports did not give the subsequent history of these cases. He pointed out that myopes of over 10 D. very seldom saw more than $\frac{6}{18}$, and in the fourth decade $\frac{6}{24}$. This raised the question, should the amblyopia be regarded as a reason for operation, seeing that some of the results of foreign observers had been extremely brilliant although the results on the whole varied widely as in other cases of extraction of the lens. The only case that appeared to bear on the prevention of changes in the chorioid and retina was Meyer's, in which, after removal of a lamellar cataract from a myope, the fundus changes were said to have progressed, and judging from the statistics at his disposal, more rapidly than they

would in all probability have done in the natural course of events. There was unanimity on the point that the patients were able to work much better after the operation, and some were enabled to follow vocations which had previously been impossible. If, however, as appeared to be the case, vision was practically sure to get worse, it would seem wise not to wait until the nutrition of the macula had been seriously impaired. Floating opacities in the vitreous, especially if in any number, would probably negative operation and diminished tension would certainly do so.

In reply to the discussion of his paper, Mr. Wray said that if patients have been using their eyes much and showed large crescents, the longer one postponed the operation the riskier it became. He admitted that the operation involved the removal of immature cataracts at a period when they were most dangerous. The results related that evening were scarcely in harmony with those recorded by foreign observers, but he thought they were bound to accept their results. The broad fact remained that in a large number of patients operated upon, sight was improved to $\frac{6}{12}$, and this improvement continued for a considerable time, nevertheless, the frequency with which detachment of the retina followed was calculated to make one pause. His object in bringing the subject forward was to elicit an expression of opinion as to its advisability, and the balance of opinion seemed to be against it.

A SUGGESTION AS TO THE TREATMENT OF PENETRATING WOUNDS OF THE CILIARY REGION AND LENS.

Robert L. Randolph, M. D., Baltimore, (*New York Medical Journal*, February 23, 1895). After speaking of the nature and dangers connected with penetrating wounds of the ciliary region and lens, the writer recites the histories of three cases with remarks, pointing out (1) the peculiar danger attending these wounds; (2) the necessity for adopting radical measures at once in dealing with these cases, and (3) the fact that the crystalline lens often acts as a foreign body and its presence rendered the condition of the eye more dangerous. His conclusions are:

1. In penetrating wounds of the ciliary region and lens, even when light perception is gone, and where usually enucleation is performed, the removal of the lens will often be followed by the recovery of comparatively useful vision.
2. The time to perform the extraction is in the first week of the injury, when there is less reason for entertaining the fear of

sympathetic ophthalmia, and that sympathetic disease is too remote a contingency in any event, and certainly at this stage, to outweigh every other consideration.

3. The effect of the operation is to remove what is really a foreign body, and at the same time it frees the ciliary region of its infectious contents—very much the effect of opening an abscess.

4. Cleanliness is imperative in this operation. I usually sterilize my instruments in a 2 per cent solution of bicarbonate of sodium, and keep the field of operation constantly irrigated with a 2 per cent solution of boric acid. Any solutions that irritate—such, for instance, as sublimate solutions—are to be avoided, as they weaken the resisting powers of the eye. The after treatment consists in the instillation of atropin, 1 per cent, every four hours, and the wearing of a compress bandage.

5. Improvement in these cases, as would be expected, is rapid, and unless it is rapid, one should not delay in enucleation.

THE PREVENTION AND TREATMENT OF OPHTHALMIA NEONATORUM, AND THE NECESSITY FOR MORE EFFICIENT LEGISLATION TO PREVENT BLINDNESS FROM THIS CAUSE.¹

BY CHARLES H. MAY, M. D.,
NEW YORK.

IT is the purpose of the author's paper to prove that, although legislation to prevent the occurrence of blindness from ophthalmia neonatorum was effected in New York State in September, 1890, it has not been successful in materially reducing the disastrous effects of this disease; secondly, he suggests a modification of the law which will, if enforced, be more certain to diminish the number of cases, or at least make it exceptional for blindness in one or both eyes to result.

After reviewing the methods of prophylaxis and treatment and pointing out the brilliant results which may be expected when these are properly carried out, he gives statistics from various eye-clinics in New York City showing the number of cases of ophthalmia neonatorum treated for each year for the past six years.

¹ *Medical Record*, Feb. 16, 1895.

One point which he brings out in connection with the treatment of corneal complications of ophthalmia neonatorum is of especial interest. He says:

"There is a general tendency, even among oculists, not to make direct applications upon ulcers of the cornea occurring in the course of this disease; while this holds good for very extensive ulceration or sloughing, circumscribed ulcers can be advantageously treated by touching them from time to time with tincture of iodine, or even the actual cautery, especially if the inflammation of the lids has subsided. Recently I have seen a number of cases do well under cauterization, and there seems to be no reason at all why such ulcers should not be treated and prevented from spreading, exactly in the same manner as in the case of other infected ulcers. In the course of time, corneæ which seem hopelessly involved, sometimes clear up to an extent which permits some vision,"

The following are the totals arrived at by his statistics:

Table showing the number of cases of ophthalmic neonatorum treated at the various eye clinics of New York City, from 1888 to 1894.

TOTAL OF FOUR INSTITUTIONS.

YEAR	Total number of eye cases	Number of cases of ophthalmia neonatorum	Cases per 1000 eye-patients
3 years.			
1888	} 76,366	452	5.92
1889			
1890			
3 years.			
1891	} 97,493	488	5.0
1892			
1893			

"A glance at the results given by this table shows that among 76,366 cases for the three years, 1888, 1889 and 1890, there were 452 cases of ophthalmia neonatorum (5.92 per thousand); while during 1891, 1892 and 1893, among 97,493 cases, there were 488 cases (5.00 per thousand). Thus there has been a reduction of less than one case per thousand since legislation has attempted to diminish blindness from this cause.

"There are several reasons why the present New York law has not had the desired effect. To enumerate briefly:

"1. The provisions of the law have not become generally known among the profession and among midwives and nurses. No attempt has been made to call attention to the law. This being the

case, midwives would become aware of its existence only through a large number of convictions, with consequent fines and imprisonment for violations. Not more than twelve cases have been prosecuted and convicted since the law became operative.

"2. The term 'legally qualified practitioner of medicine' allows the midwife or nurse great latitude in the selection of someone to whom to report.

"3. The process of prosecution of an infringement of the law involves so much loss of time to the informant—the general practitioner or oculist—that the lack of enthusiasm shown in this direction is not surprising. The New York Society for the Prevention of Cruelty to Children is not only willing but anxious to prosecute every case of violation, but it can only obtain necessary information from the physician who sees the case after the damage to the eyes is done. Through the courtesy of Mr. Jenkins, the superintendent of this society, I have obtained much information concerning the steps necessary in prosecuting. The physician who meets with a case in which non-compliance with the law has resulted in injury to one or both eyes of a child, reports the case to the society; the latter conducts the prosecution, but the physician is the main reliance in securing a conviction, and without his attendance at the courts the society cannot succeed. This involves a loss of time, first at the Police Court on one or two occasions (twice, if the midwife secures an adjournment—and this the law allows); if she is committed, her trial takes place at some future date in the Court of General Sessions. In the Police Court trials it can generally be arranged to have the case called at an hour suiting the physician's convenience. In the second trial he must present himself at 10:30 a. m. and wait until the case is called. If the woman possesses a few dollars with which to engage a lawyer, she can secure an adjournment; in such a case the physician is compelled to be on hand some other morning at 10:30 a. m. and wait for his chance to testify. After such a tedious process he may have the satisfaction of having caused the punishment of a woman who has added to the number of blind through her ignorance or carelessness; but even this feeling of satisfaction is apt to be limited when the midwife is fined but a small amount. He has lost a great deal of time and considerable practice—practically he has given up two mornings and one or two afternoons, and has suffered many inconveniences. Is it surprising that his philanthropic ardor becomes colder after one such experience? Since September, 1890, there have been but twelve prosecutions;

all of these resulted in convictions. In every case a fine was imposed; in most cases it was small, in many only \$10, in one case \$100. In no case was the misdemeanor punished by imprisonment.

"For these reasons some modification of the New York law is absolutely essential. I would suggest the following as answering every indication and as tending to be effective: Every case of ophthalmia neonatorum should be reported to the local board of health or health officer—whether such a case occurs in private practice or in an asylum, whether under the care of a practitioner of medicine or of a midwife or nurse. In the case of a practitioner, whether in private practice or in an asylum, the board of health or health officer need not interfere. In the case of a midwife or nurse it should be the duty of this board, or of the health officer of the locality, to send an inspector, upon whom the responsibility of the case will then rest. If he finds that the midwife or nurse has called in a competent physician and that the child is being properly treated, there will be no occasion for further interference; but if he discovers that this has not been done, it shall be his duty to assume charge of the case and to see that the child is properly treated, either at its home or at some hospital or dispensary. He will then also be able to serve as a witness in the prosecution of such cases, and since he is in the employ of the city or town he will not be justified in finding fault if part of his time is occupied in the courts."

These suggestions were adopted by the New York County Medical Society. At the recent meeting of the New York State Medical Society, Dr. Howe, through whose efforts the present law was enacted, spoke of its inefficacy, and had a committee appointed for the purpose of considering what steps should be taken to improve upon it and secure effective legislation.

ANTE-PARTEM OPHTHALMIA NEONATORUM (INTRA-UTERINE OPHTHALMIA).

Harry Friedenwald, M. D., Baltimore, (*Medical News*, March 9, 1895). The writer calls attention to the fact that although ophthalmia neonatorum develops, as a rule, on the second or third day after birth, there are a number of cases on record of children born with well-marked signs of the disease. "In these cases the period of incubation had passed, and the stage of inflammation was more or less advanced at birth." He was able to collect the histories of eighteen such cases from medical literature and reports

an additional one which came under his own observation. Infection probably occurred soon after the rupture of the membranes, "the infectious material being carried in most cases by the finger of the examining physician or midwife." "The number of eyes that were thus lost by corneal involvement is exceedingly large. The result is stated in fourteen of the cases; in five of these the cornea escaped, but in nine corneal opacities resulted. Though the total number of cases reported is not large, still we do not hesitate to call this form of ophthalmia exceedingly dangerous. We would attribute the virulence of these cases in part to the prolonged contact of the eyes with the poison. In cases in which infection occurs during the short time that it takes for the head to pass through the vagina the contact may be very short, and then the eyes are almost always immediately washed. The duration of contact in cases of intra-uterine infection may be hours or even days." "The application of Credé's method would appear to us to be of service in those cases only in which the infection was very recent. Bellouard suggests the use of vaginal injections, especially in those cases in which the membranes rupture early." He cites cases in which strong solutions of mercuric chloride and nitrate of silver were employed in the form of vaginal injections, and in addition, Credé's method was used, and still ophthalmia developed; though seemingly indicated, they do not appear to have been of much benefit." This form of ophthalmia neonatorum is fortunately very rare, as shown by the meager number of cases reported, as well as by the fact that such large statistical tables as those of Credé appear to be unaffected by it."

TWO CASES OF DIPHTHERITIC CONJUNCTIVITIS TREATED
BY KLEIN'S ANTITOXIN.

Mr. W. H. Jessop. Report of the meeting of the Ophthalmological Society of the United Kingdom, held January 31, 1895. (*Medical Press*, February 13, 1895.) Mr. Jessop said that he had recently had two cases of true diphtheritic conjunctivitis which were interesting on account of their rarity and because they were the first in which the effects of the antitoxin treatment had been tried. In both cases Loeffler's bacillus was found and in both there were distinct membranes on the palpebral conjunctiva. The membrane seemed to melt away, and in neither case did the purulent or mucopurulent conjunctivitis appear, the conjunctivæ presenting their normal appearance within a few days after the membrane had separated. From the time of first seeing the patient to the

total disappearance of the membrane was, in the first case, three, and in the other four days. In neither case was any local treatment employed other than the application of distilled water. The patients were 8 months and 19 months of age respectively. In one there was marked diphtheria of the throat, in the other diphtheritic manifestations were mainly confined to the nares. He gave three injections of Klein's antitoxin in the first case of one drachm, and in the second case, two injections of a drachm each. Curiously enough there was an apparent relapse in first case, accompanied by the formation of a fresh patch of membrane on the left tonsil, but the bacillus could not be found in it, though carefully searched for. He pointed out that both cases would fall under the heading of membranous conjunctivitis, and he urged that the time had come for the term diphtheritic no longer to be applied to cases of conjunctivitis. The term diphtheritic had no necessary connection with the disease known clinically as diphtheria and was, therefore, misleading. Pseudo-membranous or croupous were terms open to even graver objections, and very different cases had been described arranged under the same heading. All cases of conjunctivitis with membranes were not diphtheritic or associated with Loeffler's bacillus, and it was not yet proved that all cases of conjunctivitis associated with this bacillus had a distinct membrane, further investigation being much needed, particularly as the bacillus was found in affections of the throat without membrane. He proposed, therefore, that all cases of conjunctivitis with membrane should be merged into one class of membranous conjunctivitis or ophthalmia, and that diphtheria characterized by Loeffler's bacillus might be mentioned as one of the causes of the disease, or, if preferred, membranous conjunctivitis might be subdivided into diphtheritic and non-diphtheritic.

THE QUESTION OF THE EFFICACY OF SUBCONJUNCTIVAL
INJECTIONS OF MERCURIC BICHLORIDE IN
OPHTHALMIC THERAPEUTICS.

Charles Stedman Bull, M. D., New York, (*New York Medical Journal*, January 19, 1895). Dr. Bull reviews Darrier's method of using these subconjunctival injections and his claims in regard to the results of this method of treatment. Review of the literature of the subject showed a great diversity of opinion among various observers as to the value of this new treatment. During the past year he had employed these subconjunctival injections in 48 cases, as follows: Parenchymatous keratitis, 6; abscess of the

cornea and hypopyon, 8; scleritis and episcleritis, 2; syphilitic iritis, 10; irido-chorioiditis, 15; traumatic orbital cellulitis, 3; sympathetic ophthalmia, 2, and syphilitic neuro-retinitis, 2. He summarized as follows: 1. The pain is always severe, in spite of cocain. 2. The reaction is apt to be severe, and is sometimes very severe. 3. The only classes of cases in which the sublimate injections seem to exert any positive effect in allaying symptoms and shortening the duration were those of scleritis and acute irido-chorioiditis of the non-syphilitic type. 4. The treatment is still on trial and should not be promiscuously employed in all sorts of cases as a routine treatment. It must stand or fall on its merits, and these can only be ascertained by careful and long-continued observations of a large number of cases. Severe pain and the occasional violent reaction produced by the injections must always be a bar to the universal employment of this method of treatment.

THREE VARIETIES OF EPIPHORA.

G. E. de Schweinitz, M. D., Philadelphia, (*The Philadelphia Polyclinic*, March 2, 1895.) Leaving out of consideration the great mass of cases due to inflammatory or obstructive disease in the puncta, canaliculi, lachrymal sac and duct, the writer separates cases of epiphora into three classes:

1. *The epiphora of refractive errors*, especially frequent in patients nearing the presbyopic age who go without required optic aid, and in moderate grades of astigmatism; occurring also in cases of imperfect muscular balance. "Therefore this rule should be followed in every case of simple epiphora: Thoroughly investigate the refractive condition of the eyes and correct it if anomalous."

2. *The epiphora of intranasal origin*. This is divided into that caused by irritation of the mucous membrane and that due to mechanical interference. "The rational management of certain types of epiphora must include thorough intranasal examination and treatment."

3. *The epiphora of nervous disorders*. This occurs in neurasthenia and hysterical patients and also in locomotor ataxia. "Epiphora, otherwise unexplained, may have significance from the neurologic standpoint, and should be so investigated."

SOME ADDITIONAL STUDIES UPON THE CLINICAL VALUE OF REPEATED CAREFUL CORRECTION OF MANIFEST REFRACTIVE ERROR IN PLASTIC IRITIS.

Charles A. Oliver, A. M., M. D., Philadelphia, (*University Medical Magazine*, October, 1894.) In making these studies to determine the causal factor of the apparent and transitory increase

of ametropia, the author ignored any cases presenting evidences of corneal or lenticular opacity, disturbances in the aqueous and vitreous and adhesions between iris and lens, and limited his observations to those eyes in which the pupils were dilated *ad maximum*.

By studying the plane of the iris by the use of the corneal loupe and by the estimation of the relative positions and sizes of the catoptric images, he found that there was *no forward displacement of the lens*.

The *index of refraction* and the *actual amount of either the aqueous or the vitreous* were not increased during the inflammatory process. This was shown, "first, by careful and repeated study of the objective appearances of successive layers of these two media, by both oblique illumination and the ophthalmoscope; and second, "by reference to the fact that in nearly every case the distance between the anterior and the posterior lenticular reflexes was unduly increased."

"To make certain that the temporary increase of the index of refraction is *dependent upon either spastic tonicity of the fibers of the ciliary muscle or congestion with rigidity of the ciliary bodies*" a number of control tests with both mydriatic and myotic agents were made. "In every case in which the inflammatory process had not absolutely subsided, the use of the cycloplegic reduced the apparent amount of the refractive error (ordinarily one-fourth to three-fourths diopter), whilst the myopic increased the apparent amount of ametropia."

"The conclusion, therefore, is in every instance of this third variety of study, not only is so-called "spastic accommodation" proved, but the supposition of the forward displacement of the lens is, in a great measure, denied, and both the real and relative increases of aqueous and vitreous humour are confuted."

THE ETIOLOGY AND TREATMENT OF INTERNAL STRABISMUS.

Howard F. Hansell, A. M., M. D., Philadelphia, (*Journal Am. Med. Assoc.*, February 16, 1895). In a lengthy paper, the writer considers "functional internal strabismus arising from the unconscious constant contraction of the ciliary muscle in its effort to sharpen the blurred retinal image of the hypermetropic eye." He calls attention to the fact that there is great diversity of opinion as to the part played by amblyopia, whether a cause or effect, and as to the result of tenotomy on vision. "Hypertrophic squint, notwithstanding conscious failures in its cure, remains where

Donders left it." He dwells at some length upon the bearing of the refraction, the vision and the innervation upon the coördination of the visual axes and arrives at conclusions as follows:

"1. Amblyopia is congenital and not acquired; is not improved by tenotomy when high or of long duration; is always present in monocular squint; is not a factor in alternating squint; can be replaced by full acuity of vision after the hitherto good eye has been rendered by accident or disease inferior to the squinting eye.

"2. In monocular constant squint, the cornea of the squinting eye is turned upward as well as inward.

"3. In concomitant or alternating squint, the non-fixing eye is turned upward as well as inward, and with transference of fixation there will be a transference of both the upward and the inward deviation.

"4. Donders's theory, extended to include all the muscles supplied by the third nerve, and not the interni alone, is a sufficiently satisfactory explanation of the upward deviation.

"5. Atropia and full correction are, in many cases, curative agents.

"6. All operations should be done under cocain anesthesia.

"7. In monocular squint vertical equilibrium must be restored by tenotomy, while in alternating, division of the interni is sufficient."

EXFOLIATION OF THE COCHLEA, VESTIBULE AND SEMICIRCULAR CANALS.

BY M. A. GOLDSTEIN, M. D.,
OF ST. LOUIS, MO.

IN the history of otology, reports of cases of exfoliation of the labyrinthian structure have always created more than a passing interest on account of their rarity of occurrence, the importance of their recognition and the value of the many clinical phenomena observed in the course of so extensive a necrotic process in the delicate structure of the temporal bone.

Caries and exfoliation of the cochlea alone, as a sequestrum separate from the rest of the labyrinth, has been observed and described comparatively frequent. From the interesting bibliography on the subject may be mentioned a comprehensive report by Bezold, of Munich; in a monograph published in 1886 are collected perhaps the richest statistics of necrosis of the labyrinth coming under the notice of an individual observer. In the clinical observations in a series of forty-six (46) cases, he summarizes the principal factors bearing on the subject, as follows:

Necrosis of the labyrinth occurs in the male with twice the frequency that it does in the female; children under ten (10) years of age are especially predisposed to this affection (18 cases in 43); the acute exanthemata, especially scarlet fever, play an important role as causative factors in the long-continued suppurative otitis, with its frequent tendency to involvement of the internal ear; the necrosis usually follows in the wake of a suppurative otitis of long standing; in two (2) cases only necrosis occurred after an otitis of eight months' duration; in twenty-one (21) cases the otitis was of four years' standing; in eight (8) cases, of twenty (20) years; only one case is cited where the necrosis of the labyrinth is described as the primary and the otitis as the secondary process; the exfoliation and elimination of the sequestra occurred in 37 of 46 cases cited during the course of the disease; in nine (9) cases death ensued before the elimination of the sequestrum. Larger sequestra, composed not only of the cochlea, but also of the vestibule, semicircular canals and pars acusticus internus, have been met

with but rarely. Such cases have been cited and described in detail by: Wilde (*Treatise on Diseases of the Ear*, 1854, p. 358); Shaw (*Transactions of the Pathological Society*, London, vol. VII.); Toynbee, (*Arch. f. Ohrenh.*, 1864, Bd. I.); Agnew, (*Amer. Med. Times*, vol. VI., p. 185, see Troeltsch, 1869, 2d Am. ed.); Voltolini, (*Monatschr. f. Ohrenh.*, 1870, No. 6);



FIG. 1.

Illustrating the existing facial paralysis on affected side. Prior to operation the patient had complete motor paralysis of right eye; the photograph, taken one month after operation, indicates considerable amelioration of the described condition.

Pomeroy, (*Transact. Amer. Otol. Soc.*, 1872); Blake, (*Ibid*, 1880, vol. II, p. 417); Pollak, (*Archives of Otology*, 1881, vol. X., p. 361); Sexton, (*Illus. Quar. of Med. and Surg.*, N. Y., January, 1882). In the two cases cited by Toynbee, the sequestra were not removed until after death. In the other cases, with the exception of those of Pomeroy and Pollak, the large sequestra

were removed through the external auditory meatus. In the case reported by Pomeroy the large sequestrum was exfoliated by a natural process of elimination from the opening of a sinus behind the auricle. In Pollak's case the necrotic process had advanced to such a degree that the sequestrum, the major portion of the temporal bone, was lifted out of position and removed by the surgeon's fingers, no instruments being required. Each of the cases recorded was attended by a very marked facial paralysis, great disturbance of gait and equilibrium, and complete deafness on the affected side.

The case herewith described may, perhaps, in consideration of the size of the sequestra and the numerous clinical phenomena recorded, deserve a recognition with the rarest cases of necrosis of the labyrinth as yet reported.

H. M., colored, male, 6 $\frac{1}{2}$ years of age, has always been well nourished and of average strength and activity. At the age of three years (December, 1891) patient contracted measles, from which he recovered without any of the frequent aural complications. One year later (November, 1892) an intense, acute ear-ache of several days duration ensued, followed by a copious purulent discharge; for eighteen months the discharge continued freely, uninterruptedly, without the accompaniment of any unfavorable symptom, the patient not even experiencing the slightest pain or difficulty in hearing. May 1, 1894, applied at the ear clinic of the Missouri Medical College Dispensary, where he received his first regular treatment for six weeks. During the following month the patient absented himself from the clinic.

July 17. Patient was admitted to the ear department of the Missouri Medical Polyclinic. His general condition and the suppurative process had now assumed a decidedly unfavorable aspect. The discharge had stopped, due to the plugging of the entire external auditory meatus with a cheesy mass, which, on examination, proved to be composed of partially dried and inspissated pus, epithelial shreds and detritus, emanating a thoroughly fetid and offensive odor. The entire posterior auricular region was very sensitive to the slightest pressure, the auricle assumed a position at right angles to the side of the head; the surface of the skin presented a sodden and irregular appearance; there was considerable induration, with distinct points of fluctuation, especially above a circumscribed area in a line with the upper margin of the auricle. This was incised and drained of about one and one-half ounces of green, fetid pus. A marked and almost

complete facial paralysis was demonstrable on the affected side. A small sinus, from which a spicula of bone had been recently discharged, was present, situated one-half inch posterior to the insertion line of the auricle and in a line with the posterior border of the lobule. Such was the condition existing when I took charge of the case, August 3.

August 5. The patient was prepared for operation. I made a long, free incision, connecting the upper, postero-auricular abscess opening with the orifice of the sinus described. Hemorrhage was profuse and difficult to control, owing to the disorganized condition which the tissue in the field of operation had assumed by the long continuation of a severe necrotic process. A firm pressure by broad retractors was applied, and a free opening to the bone made. Placing a curette in position, preparatory to the removal of the necrotic bone mass, I observed a serious condition. The entire area was one rotten mass, and could have been more easily ladled out with a spoon than removed with a curette. After considerable manipulation with curette, forceps and irrigator, I succeeded in exposing to view a sinus, leading downward and forward, with a depth of nearly two inches, and diameters varying from one-half to one inch. The parts were thoroughly irrigated with bichlorid of mercury solution (1-1000), which was a difficult task, under the circumstances, as a communication had been established through free exposure of the Eustachian tube between the ear and naso-pharynx, and, there was considerable danger of asphyxia and accidental complications while the patient was under chloroform. The wound was well dusted with iodoform, packed with bichlorid gauze, and a well-padded compression applied. One hour later the little patient was up and walking part of the way home.

The following day I removed the first dressing. The discharge was profuse and the odor excessively fetid. Irrigated with warm bichlorid of mercury solution (1-1000). The patient swallowed a considerable portion of the solution. The communication between the large posterior opening and the auditory canal was free and drainage good. The cleansing and dressing of the wound caused the patient no discomfort, beyond that of the fluid entering the nasal and pharyngeal cavities during irrigation. The advantage of such an irrigation, in which the wound, the ear, nose and pharynx were simultaneously cleansed, is self-evident. It was noticed after the second dressing that the motor paralysis of the right eye had partially subsided, and that the patient was now

able to close the eye within one-quarter inch of complete closure. The dressings were reapplied daily for three months with but slight change in the general appearance of the wound or patient. Throughout the entire course of treatment, since the operation, there has been absolutely no pain, tinnitus aurium, vertigo, nausea and vomiting, or febrile reaction.

About the first week in November a change was noted in the general condition of the patient. He became restless, peevish, and complained of a general feeling of lassitude with a constant drowsiness.

The clinical memoranda appended will show the most interesting features in the development of the case.

November 5. On redressing the wound, noticed for the first time a necrotic mass of bone, black in color, rough in surface appearance and touch, projecting from the antero-lateral wall of the posterior auricular sinus. Discharge profuse and intensely fetid.

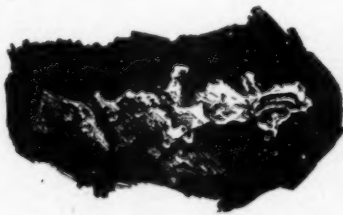


FIG. 2.

Main sequestrum; outer side; natural size. The beautifully preserved spiral of the cochlea stands out almost like an isolated picture from the rest of the petrosal. The full size of the exfoliated mass is well indicated.



FIG. 3.

Main sequestrum; inner side; natural size. The relationship of the labyrinthine structures is here clearly represented. Adjoining the prominent cochlea is the vestibular space with the ampulla plainly visible; also a considerable portion of the posterior semicircular canal. At the further end of the specimen is the honeycomb mass of mastoid cells. The specimen measures 36 mm. in its longest diameter; 18 mm. in its broadest diameter.

November 6. On irrigation, numerous soft, long discolored shreds were washed away. Discharge in 24 hours amounting to half an ounce of viscid, greenish, foul-smelling pus.

November 7. The black necrotic mass appeared nearer the surface of the sinus orifice. When touched with the tip of the irrigating syringe, it was found to yield slightly. With a strong shanked, milled-pointed dissecting forceps the mass was firmly grasped, the head of the patient steadied, and by gentle, steady

traction, the entire sequestrum was painlessly removed, through the fistulous opening. Not the slightest hemorrhage ensued, even oozing being scarcely perceptible. The entire proceeding was borne by the patient without the least expression of pain or a single unfavorable symptom. The wound was lightly packed with iodoform gauze and the auditory canal cleansed and dried. Sound tests were then instituted, as hereinafter described.

November 8. The discharge diminished to one-third the quantity, issuing only from the auditory canal. The posterior wound, through which sequestrum had been removed, was clean, the gauze strip being removed almost dry and without stain. Inspection reveals the walls smoothly lined with numerous soft granulations. The fetor had disappeared. Drainage free. Antiseptic irrigation used throughout the treatment. Walking and standing tests for equilibrium were made.

November 9. The discharge remained odorless; quantity unchanged; general condition much improved.

November 11. Patient had again assumed his former lively disposition; ate heartily; slept soundly; rarely offered a complaint of discomfort. Perceptible decrease in the quantity of discharge.

November 12. On inspection by illumination, after thorough irrigation, detected a flat oblong sequestrum at distal end of long sinus, and gently removed same with forceps. Removal painless and without the slightest sequence. In the depth of the wound canal a pulsating or oscillating fluid, seemingly clear and shining, was discernable, and supposed to be the mucous of the exposed Eustachian tube.

November 13. Only traces of pus in the external auditory meatus; small, soft necrosed masses detached from the depth of the canal and removed with forceps and syringe.

November 14. Mirror illumination in wound canal revealed the presence of a necrotic bone mass attached to the posterior wall of the sinus. Examined with probe, it was found loose, and with forceps this, the third sequestrum, was easily removed.

November 15. Discharge very slight. Another small sequestrum was removed from the upper wall of the sinus. Numerous healthy looking granulations were observed in the depths of the sinus. Patient began to cough; a hoarse, short cough with frequent expectorations.

November 16. Discharge practically *nil*; a slight serous exudation noticed; similar to that found on granulating surfaces. Profuse granulations filling sinus.

November 20. Again some slight discharge. Located a small focus near the distal end of the bony portion of the internal auditory canal, with accumulations of epithelial shreds and pus.

November 25. Discharge of a yellowish green color, of thick consistency and increasing quantity. Cough had become more aggravated, loose, and expectoration profuse and of a muco-purulent character. Microscopical examination of the sputum revealed the presence of the tubercle bacillus in large numbers.

December 10. A bone sequestrum presents near the wound orifice. By restlessness of patient during attempted extraction, the mass was pushed out of place. Free communication between the sinus and the external auditory canal exists, as indicated by the probe in manipulation.

December 11. The sequestrum again presents, this time in the external auditory canal; presents with long diameter of sequestrum transversely to the axis of the external auditory canal. After some manipulation succeeded in turning and removing the rounded necrotic bone mass from the posterior sinus.

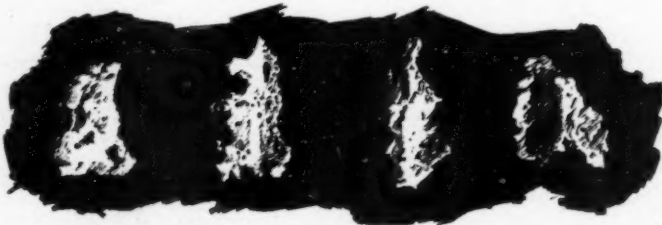


FIG. 4.

Sequestra in the order of their removal; natural size; all four sequestra were painlessly removed through a sinus of about three-quarter inch average diameter. The operative procedures, including the removal of the sequestra, extended over a period of about six weeks.

December 15. No discharge; wound looking comparatively dry. Irrigated thoroughly and dusted canal and wound with iodoform; very small gauze strips inserted.

December 19. Both wound and auditory canal dry; dressing of four days' standing removed dry and unstained.

January 5. Condition of wound unchanged. The patient was in lively spirits, talkative, and felt no discomfort from his recent siege of treatment. He was considerably emaciated, cough was still very harassing; expectoration profuse. Physical examination revealed the following: In the apex of the left lung there was cavernous percussion sound and rales. Over the entire area of the

right lung mucous rales, with slight percussion dullness; harsh inspiration over the right apex; prolonged expiration of high pitch; numerous subcrepitant rales. History of case points to the probability of a rapidly developing phthisis pulmonalis. The mesenteric glands are enlarged and easily localized by palpation. The cervical and other lymph glands of the head present almost a "rosary" outline, so general, regular and continuous is their enlargement. The sputum contained numerous tubercle bacilli. Emaciation of the patient had been marked and rapid the previous few weeks. A phthisical febrile reaction noted; rise of temperature, accompanied by night sweats and continued coughing.

By far the most interesting and important factor which presents itself for consideration in this case was the existence of the faculty of hearing on the affected side after removal of the cochlea and deep structures of the petrosa.

I have been thoroughly cognizant of the difficulties and responsibilities attending an effort to substantiate so radical a statement, and have necessarily adopted the most careful methods and delicate tests to convince myself of the accuracy of my conclusions. The most serious obstacle to contend with was the exclusion of the healthy ear from the sound tests which were instituted. In the majority of the tests made I adopted the method suggested by Dennert and Luca, with modifications. In determining what degree of sound perception still exists in an affected ear in a case of one-sided deafness, the healthy ear of the patient is stopped, turned towards the source of sound and the tests then made, the affected ear being alternately opened and closed. Whatever difference in the hearing then elicited, is attributed to the affected ear.

A more delicate modification of this method has been successfully used by Burnett. The patient is so placed that the affected ear is toward the operator. The healthy ear (not the ear to be tested) is plugged. With the affected ear open, hearing tests are then instituted. Having thus reached the apparent limit of the hearing power of the affected ear, that ear is then closed, and the tests continued. If the closure of the deaf ear causes no difference in the hearing distance already obtained, it is fair to conclude that whatever amount of hearing exists is not due to passage of sound through the external auditory canal of the affected ear turned towards the test. In such a case the conclusion must, therefore, be that sound has reached the brain through the agency of the healthy ear. If, however, the stoppage of the affected ear is accompanied by an absolute inability to hear sound tests, it is

again rational to conclude that this difference in the hearing power must be attributed to the affected ear. Thus, the final conclusion: "Whatever is heard just as well with the deafer ear stopped as when open, the better ear remaining stopped throughout the testing, must still be heard by the better ear through the head; but whatever is heard only with the worse ear open, the good ear being stopped, must be attributed to the worse ear."

The question might be asked, why cannot sound be conveyed to the deaf ear through the head; if it is conveyed to the better ear which is stopped and turned away from the sound source? The reply would be that an ear which, either when stopped or open, perceives no difference in sound conveyed by the meatus, is not sensitive enough to hear sound conveyed to it through the head.

In the consideration of the case at hand, bone conduction tests by aid of tuning forks were excluded, as they were deemed less delicate for a differential than aerial sound conduction. Furthermore, as our dealings were directly with an exfoliated labyrinth, the tuning fork, relative to bone conduction, was practically of no value.

The following tabulated notations will indicate clearly the conclusions reached in hearing tests of the affected ear:

HEARING TESTS.	Hearing capacity with both ears closed.	Hearing capacity with affected ear open and good ear closed.
Loud conversation.....	300 cm.	900 cm.
Whispered conversation.....	30 cm.	90 cm.
One hundred and fifty centimeter watch.....	5 cm.	15 cm.
Politzer's acoumeter, designated by patient as a loud ticking watch.....	15 cm.	35 cm.
Galton whistle; pitched high.....	30 cm.	60 cm.
Differentiation in sound of C from C ⁴ tuning fork.....	8 cm.	35 cm.
Musical notes of a long sounding-harmonium. Differentiation of C (3d octave) from C (5th octave).....	35 cm.	90 cm.

In the execution of the enumerated tests the patient was blindfolded; the plugging of the meatus was done by a competent assistant, the fore-finger being used as a tight plug. Taking into account the age of the patient and all tendencies to a possible misrepresentation of the hearing capacity, the tests were repeated at frequent intervals with many variations; yet the tests proved doubly valuable, owing to the demonstrable accuracy of the patient's statement.

Next in the order of importance of the clinical phenomena observed, was the preservation of the equilibrium and balance of the patient. As previously stated, one hour after the operation, patient was up and walking home with absolutely no trace of altered equilibrium. Walking and standing tests have been repeated frequently, varying the same in every conceivable way by blindfolding the patient, testing with eyes closed, permitting the patient to walk under the influence of loud noises, etc. The results were always positive; his gait firm and steady; the power of equilibrium preserved to a nicety.

A factor of great interest was the prominent role played by the bacillus tuberculosis in the development of this case. Early in the history of the case a microscopical examination was made of the discharge from the ear and the presence of the tubercle bacillus demonstrated. A physical examination at that time gave no indication of a phthisical onset. The free communication of the suppurative aural focus with the pharynx; the tendency to frequent swallowing of this purulent material infected by the tubercle bacillus; the gastro-intestinal disturbances; incessant coughing; profuse expectoration; febrile reactions; enlargement of the lymphatics of the entire system; rapid emaciation; great prostration; and, finally, the involvement of the lungs, as determined by recent examination; the demonstration of the presence of the bacillus tuberculosis in the sputum—this well-marked series of symptoms point to a development of a rapid phthisical process. It seems rational and reasonable to conclude that this acute phthisis is, perhaps, a secondary development of the original tuberculous process in the ear.

In maintaining my position in the case at issue, with my conclusions drawn from the careful tests made and clinical phenomena observed, I realize that I am treading on delicate ground, and that the presentation of these results opens for consideration a new phase of development in the theory of sound, and in the complicated functions of the labyrinthian structures.

It is not my purpose to discuss the pros and cons of the theories which the results attained in the present case may suggest, but to indicate in the presentation of this series of simple firm facts, the existence of some inaccuracies in the now accepted theory of sound, and in the functioning of the semicircular canals in relation to balance and equilibrium.

POST-MORTEM NOTES.

The diagnosis and prognosis of a rapidly-developing and speedily-terminating miliary tuberculosis, as a complication and

infection secondary to the aural disease, in the case at issue, as expressed in the preceding pages, was thoroughly substantiated in less than one month after presentation of patient and complete demonstration of the results attained, before the local medical fraternity.

January 5. Patient was presented at the Saint Louis Medical Society. He was then bright, active and in good spirits.

January 15. General depression; painful, incessant cough; profuse expectoration, showing bacillus tuberculosis abundantly on microscopical examination; intense dyspnea; febrile disturbances; abnormal pains; severe diarrhea. The only cerebral symptom, mild stupor. Progressive emaciation and prostration with continuance of these symptoms was followed by the death of the patient January 29.



FIGS. 5 AND 6.

Necrosed temporal bone. Post-mortem removal. a. Mastoid process. b. Styloid process. c. Cartilaginous external auditory meatus. d. Necrotic sinus of about three-quarter inch average diameter, through which sequestra were removed. e. Area of necrosis. f. Zygomatic process. g. Squama. h. Remnant of posterior surface of petrosa, with the internal auditory meatus partially intact.

Unfortunately permission was not granted for a complete autopsy. The right temporal bone was removed, and the involved area carefully inspected.

The dry antiseptic dressing, applied ten days before, was removed perfectly clean. The post-auricular region showed but moderate depression at the site of so extensive a necrotic process; the sinus was almost closed, scarcely admitting a large probe.

Examination of the affected temporal bone, after its removal, corroborated our descriptions of the necrosed and exfoliated areas. Circumscribing the region of the osseous external auditory meatus, and involving the mastoid and squama, with a radius of about three-quarters of an inch, was a necrotic zone with irregular, but well defined margin. Designating this as the base of a long, cone-shaped canal, we note an axis of about two and one-half inches in length, directed inward, downward and backward, with its apex merging into the Eustachian tube. This cone-shaped sinus, through which the exfoliated bone masses were removed, was filled with quite firm, closely meshed granulations. All landmarks of the osseus meatus auditorius externus and cavum tympanum had disappeared. Of the petrosa, the superior wall and part of the posterior portion of the meatus auditorius internus still remained intact. Examined while fresh, the portion of the nervus acusticus, lodged in the depth of this canal was to all appearances normal in color and consistency.

After removal of the bone, the exposed cavity was carefully examined, with special stress laid on the cranial areas in direct relationship to the necrosed bone. On the periosteal surface of the bone still remaining, numerous erosions and irregularities were noted, yet the dura mater at all points was perfectly firm and intact. With the existence of a so disseminated and rapidly progressing tubercular process, our anticipations of the presence of a tubercular meningitis might have been well founded; the most careful and detailed search, however, failed to reveal any meningeal lesion whatever.

As it is not my intention in the present article to enter into a discussion of the probable theories of the physiology of sound, neither do I propose suggestions relative to these post-mortem notes.

It may be remarked that in a case of miliary tuberculosis, with the primary infection an aural one of long standing, and a necrosis, which by its extensive bone destruction, exposed to direct contact with the specific suppurative processes the largest portion of the temporal lobe, lateral sinus and temporal section of the internal carotid artery, the absence of any meningeal or cerebral complications must be considered a rare occurrence.

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AN UNUSUAL CASE OF AURAL DEFORMITY;
OPERATION.BY J. HOLINGER, M. D.
OF CHICAGO.ASSISTANT SURGEON, EAR DEPARTMENT, ILLINOIS CHARITABLE EYE AND
EAR INFIRMARY.

R. H., a girl, 14 years of age, came to the Illinois Charitable Eye and Ear Infirmary because hearing in her right ear had been growing poorer, besides, she had been troubled by subjective noises and occasional attacks of dizziness. Examination revealed a somewhat retracted drum-membrane; whispering heard at 20 cm. All these symptoms improved greatly within a short time. The patient was not well developed physically for her age and she articulated with difficulty, but her answers showed that she was fairly well developed mentally. In the external angles of the eyes two reddish tumors of the size of a bean attracted the observer's attention; they appeared most distinctly when the eyes were turned as far inward and upward as possible. Dr. Beard removed these growths.

Of greater interest was another much greater deformity, which was hidden very neatly by her hair. The whole head, especially the face, was assymetric. The left facial side was inferior to the right in all dimensions and showed a marked depression which extended from the ramus of the lower maxilla to the linea temporalis, and from the zygoma to the occipital region. The lowest point was the ear. The lobule was a little smaller than normal but it seemed as if the superior point of insertion of the concha had been drawn downward and forward toward the external angle of the mouth, from which it was only $1\frac{1}{4}$ cm. removed. The line of insertion formed three-quarters of a circle, and the free margin of the concha was bent upon itself forward and at an acute angle. The tragus was missing, so that one could look through the open quadrant into the funnel-shaped external canal, which at slight depth, was impervious to thin probes. In the same anesthesia, in which Dr. Beard removed the growth from the second eye, the concha was corrected with the kind assistance of Drs. Morgenthau and Hardie. Half the concha

was dissected from its broad and flat attachment to the cheek, and sewed to an incision in the vertical prolongation of the still adherent part. The force necessary to bring together by stitches the original 2 cm. broad insertion caused the incision to gape sufficiently and enabled us to avoid sacrificing any skin at the posterior incision, although the wound in the cartilage on the posterior surface was 1½ cm. broad; at the same time the strong tendency of the concha to dip forward, *i. e.*, to double upon itself could be combated in a fashion similar to that adopted in operations on fan-ears. To be sure the mouth was drawn somewhat toward the side operated upon and a slight ectropium was produced. Both, however, disappeared soon. The result of the operation was a small vertical cicatrix in front of the ear, and a somewhat pointed ear; the latter was produced because the whole of the dissected margin was not stitched to the incision, but the free portion was rounded and covered with skin. The point was formed by the original attachment of the helix to the cheek and was at the same height as the other ear.

This case is also worthy of attention in anatomical and embryological directions. The lower maxilla can be moved from side to side. The ascending ramus with the coronary and articular surfaces is entirely wanting. The masseter is very weak, and the temporal muscle cannot be felt either during mastication or while at rest. It was not possible to investigate the smaller muscles. Since the field of operation extended forward into the cheek we expected to meet with the temporal artery, but no vessel of its size was encountered. Only at the lower angle of the wound there was a severe parenchymatous hemorrhage from the parotid gland, which was in its normal location. The oral cavity appeared normal in front and to the right. On the left side, however, the alveolar processes of the upper and lower maxilla were increased to twice their normal thickness; and all of the teeth back of the two canines stood at the sides and margins of the jaws in all possible directions and were unfit for masticating. The velum hung down loosely on the left side, following passively the movements of the other side. This proved very important during the narcosis. After the patient had been in excellent anesthesia for more than half an hour, sudden spasmodic inspiratory movements set in, as if the tongue had fallen back. Although this was immediately drawn forward, matters grew worse; *i. e.*, the inspiratory attempts became light and superficial, the pulse slow and thread-like, the wound stopped bleeding, and there was great cyanosis. On opening the mouth widely it appeared that the velum

was stretched and drawn to the root of the tongue. Introducing the finger in the manner customary in examining the naso-pharynx, the uvula was drawn with some difficulty from the glottis; and after performing artificial respiration pulse and breathing became normal. The same thing occurred twice during the anesthesia, and was remedied in the same way.

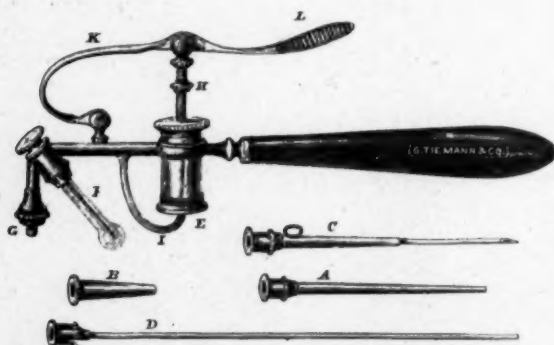
Now the question arises, how can we explain this malformation? Against its originating post-partum we must adduce the deformity of the concha, which shows its later shape very soon. The same holds good in regard to the later intra-uterine period. We must, therefore, go back to the first and second months of the fetal period. In the second month—the fetus being 1.5 *cm.* long in the beginning and 3.5 to 4 *cm.* at the end of the month—the shape of the external ear is already a rather well defined one. We must therefore go back to the second half of the first month, perhaps between the 20th and 30th days. The embryo is 5 to 8 *mm.* long; the branchial clefts are already closed, and the parts of the branchial arches begin to adopt their later forms. The osseous portions contribute to the formation of the middle ear; the membranous, to the external ear. In our case accurate investigation of the middle and inner ear was not practicable because the external canal was closed, but examinations with tuning forks pointed to the existence of an inner ear. Others, however, who have had opportunity of examining similar cases post mortem, found the inner ear intact. This fact, the general condition, and the shape of this concha, appear to justify the following explanation:

The entirely different origin of the external and internal carotid from the ventral and dorsal aortas (the stage persisting in fishes) suggests that the mandibular arch suffered in its nutrition by irregularities in the closing of the primary aortic arches of this side; that, as a result, it was temporarily arrested in its development and finally, on meeting the other side, and closing the face it brought with it the upper part of the auricles. This appears all the more plausible because the upper part normally is the last to develop while the lower part (*i. e.* lobule and external canal) is more firmly anchored to the middle and inner ears which, meanwhile, have grown inward, away from the surface.

THE INJECTOR OF DELSTANCHE, WITH MODIFIED MIDDLE EAR TIP.

BY DAVID N. DENNIS, M. D.,
OF ERIE, PA.

THE instrument here described does not seem to be as generally known among the otologists of this country as its merits deserve. The instrument was devised by Dr. Chas. Delstanche, of Brussels, and is called by him an Injector and Aspirator. The instrument is really a small syringe, but so arranged that fluids do not come in contact with the packing. From its shape and method of use the field of operation can be kept in full view. It is easily and quickly handled; the tips can be held perfectly still and rigid when in use, not the tendency to thrust deeper that there is in using the ordinary middle ear syringe. The instrument is made of metal and glass. The accompanying illustration explains its form and construction.



The cylinder *E* is similar to a short hypodermatic syringe, the spring which is a continuation of the thumb-plate keeps the piston out to its full extent. By depressing the piston the impulse is carried through the pipe *I* to fluid contained in glass receptacle *F* forcing it out at *G*. The glass receptacle is detachable, permitting of thorough cleansing. Considerable force can be given to the

stream or it can be forced out drop by drop. The sharp cannula *C* is for hypodermatic use in and about the ear. The stop *H* regulates the amount thrown out. The attachment *B* is adjusted to fit a Eustachian catheter, and is used to throw medicine into tube. The original model has numerous pipes of steel curved in different directions. A cannula of pure silver has been substituted for the numerous ones of steel. This makes it possible to bend the tip into any desired shape. I have used a silver cannula as an attachment to the ordinary middle ear syringe for a number of years, and find it a great improvement over the steel ones ordinarily supplied with these instruments. The injector is also of use in washing out or medicating the nostrils where it is desirable to see the field of operation. The instrument has been made by George Tiemann & Co., of New York, after the original model.

ABSTRACTS FROM CURRENT FOREIGN OTOLOGICAL LITERATURE.

By T. MELVILLE HARDIE, B. A., M. D.,
OF CHICAGO.

PYEMIA OF OTITIC ORIGIN.

Hessler contributes an interesting paper on pyemia of otitic origin to the *Archiv. f. Ohrenheilk*, XXXVIII, 1 and 2. He devotes considerable attention to the condition of the lungs in pyemia following sinus phlebitis, and as his conclusions are somewhat radical they will at any rate be read with interest.

After a careful review of the literature he has been able to find but 10 well defined cases of pyemia with sinus phlebitis and metastases, in which the lungs were free from metastatic abscesses. These are very briefly referred to. In 14 additional cases the pulmonary condition was not described, while in 134 cases metastatic abscesses in the lungs were demonstrated post mortem. He has further collected 83 cases in which the pyemic symptoms during life suggested sinus phlebitis, which was too demonstrated post mortem, but in which there were no metastatic abscesses discovered; further, 24 cases of the same sort which terminated in recovery. Of the 40 cases of pyemia with metastases which recovered, there were 19 in which the lungs were affected. In 38 cases, in which the sinus and jugular veins were treated surgically, symptoms referable to the lungs were present in 17, although lung symptoms were absent altogether in but 7 of the remaining 21.

In a further series of 24 cases which were operated upon, there were 17 with abscess in lungs and other organs, as against 7 in which the lungs were not affected.

We have therefore, in all, 238 cases, in 17 of which the pulmonary condition was not noted, in 41 of which there were present metastases in various organs, but not in the lungs, and 180 cases in which the lungs were also involved.

Hessler, however, greatly doubts the correctness of this estimate. He has frequently found cases described in which during life there were neither objective or subjective symptoms of lung trouble, but in which the post mortem examination showed numerous hemorrhagic and purulent metastases in the lungs. It is also well known that the pulmonary symptoms are frequently of very short duration, and if the examination is not made soon after the infection, or if the abscesses are not numerous or superficial, their presence may easily be overlooked.

We must conclude that those cases of pyemia in which metastatic infarcts are not present in the lungs, as well as in the other organs, are infrequent; that cases do exist in which no metastatic infarcts in the lungs occur, although sinus phlebitis was shown post mortem, and in which, on the other hand, they are occasionally present when post mortem examination shows no sinus phlebitis.

Hessler takes exception to certain of Koerner's conclusions (*Die otitischen Erkrankungen des Gehirns, der Hirnhäute und der Blutleiter*, 1894): (1) That embolic metastases are more frequent with sinus phlebitis than with osteo-phlebitis. (2) That the ear affection causing the phlebitis is more frequently acute than chronic. (3) That the metastases following sinus phlebitis are almost always in lungs, while in osteo-phlebitis they are usually in joints and muscles. Hessler's statistics controvert all three positions. Koerner's pathology and treatment are next considered and not agreed to. With regard to treatment Koerner considers it sufficient to remove the seat of the disease in the temporal bone. In Hessler's opinion it is not enough to give free exit to the pus from middle ear and mastoid cells. If the pyemic symptoms do not disappear after paracentesis, extraction of polypi, opening of mastoid and exposing of the sinus, ligation of the jugular must be done so that in the lighter cases the further taking of osteo-phlebitic particles into the circulation may be prevented, and in the graver cases, that the process may be confined, if possible to the sinus and jugular vein. Unfortunately exact diagnosis is in the present state of our knowledge often very difficult, and each case must be treated on its merits after a careful consideration of all of the symptoms.

Hessler's article concludes with a recital of the symptoms observed in pyemia with metastases in which the sinus is only partially affected, and in which the prognosis is favorable. Nine cases' histories are appended.

THE RATIONAL TREATMENT OF ACUTE OTITIS MEDIA.

An elaborate study of the treatment of acute inflammation of the middle ear from both a clinical and a bacteriological standpoint is undertaken by Gradenigo and Pes in the *Archiv. f. Ohrenheilk.* XXXVIII, 1 and 2.

Gradenigo's aim is to find a method of treatment based upon the facts we have learned from bacteriology and one which at the same time conforms to the well established rules of present day surgery. Some idea of the care which has been taken in the preparation of the article may be gained from the fact that there are 142 references to the literature of the subject. The historical sketch is sufficiently complete and the authorities carefully ranged in favor of or against the various methods in vogue. Treatment of the nose and nasopharynx, poultices, hot and cold water applications (of which the most extraordinary is de Rossi's instillations of ice water), the air douche and catheter, the stage of the disease in which paracentesis is indicated, the many antiseptics and astringents are all discussed and the point made that the only things agreed upon are paracentesis and asepsis.

Gradenigo thinks it of the utmost importance from a therapeutic standpoint to study the development and progress of the disease. It is known that acute otitis media can be caused by any one of several micro-organisms; of these comes first the diplococcus of Fraenkel. Nevertheless accessory causes are not to be overlooked, especially chronic catarrhal conditions; the divisions of middle ear inflammation into catarrhal and purulent cannot be admitted from the bacteriological standpoint. The development of an acute process depends largely upon factors apart from the micro-organisms. Netter found in the ears of young children the same microbes which are present in acute middle ear inflammation in the adult. Further observations in this direction are necessary.

If we except cases in which there is a traumatic lesion of the drumhead, we may conclude that all infections of the middle ear are secondary and that the micro-organisms enter the middle ear by the Eustachian tubes. Gradenigo believes that infection takes place in this way even in typhus, measles, scarlet fever, pneumonia, etc., in all of which the general condition of the patient and the resisting power of the mucous membrane are greatly lowered. While over 100 species of micro-organisms have been described as existing in the naso-pharynx, the sort of germ is obviously of much more moment than the number of kinds present. It is further known that many pathogenic micro-organisms do not possess

under all circumstances sufficient virulence to cause an acute infection, but are apparently influenced by chemico-physical conditions with which we are not sufficiently familiar. It is therefore impossible to predict for any particular micro-organism any certain course. Furthermore, although but little remains to be learned as to the kinds of germ which can set up an acute inflammation, no one has up to the present made bacteriological control-examinations of the various methods of treatment. This the authors have endeavored to do.

When the infectious character of the disease was known, trials were made with antiseptic solutions. These were unsuccessful, because the quantity of the weaker strength which could be used was relatively too small, and stronger solutions would cause so much irritation as to aggravate the process, and even if one could use enough of a strong solution the folds and thickness of the mucous membrane and irregularities of surface in the middle ear make thorough asepsis impossible. One can observe also that the inflammatory process in the middle ear as in other organs has a tendency to pursue a certain cycle. An adequate knowledge of this course is necessary to the correct treatment.

Another question which arises in many cases is that of paracentesis. It is of course possible to change by means of this operation a catarrhal into a purulent inflammation if proper antiseptic precautions are not observed, and it may be even a dangerous operation if, through uncleanness or irrational inflations, a secondary infection occurs.

While Gradenigo considers the air douche injurious he thinks the use of antiseptic irrigations equally pernicious. The increase in the pain follows the washing at a certain interval and for this reason is frequently not ascribed to it, especially if the washing out of the ear is practiced often. Washings are recommended to prevent a collection of pus in the external meatus. The aim is better attained by drainage. The washings may in some who have sensitive skins cause eczema, furuncle, etc. Even more may properly be urged against irrigation *per tubam*.

Against too rapid conclusions as to the therapeutic worth of any particular treatment the authors urge the fact that acute inflammations of the middle ear last a very variable time. However, in children and in adults with scars which are easily broken through, spontaneous perforation occurs early, and as a rule recovery takes place in a few days. With chronic catarrh and thickened drumheads severe complications frequently occur, while in the

aged, in whom the inflammatory process is not so acute and in whom the exudation remains in the middle ear for several months, marked deafness and severe subjective symptoms result.

Gradenigo's method of treatment is as follows: "When the acute otitis is in the first stage, the pain having lasted but a few hours or having moderated, when only the upper segment of the drumhead is reddened and the hearing power on the affected side is still good, an abortive treatment should be instituted, *i. e.*, rest in one's room or in bed, light diet, gargles, washing of nose with lukewarm salt water and instillations in the ear of 1.5% to 2% solution of carbolic acid. The use of a solution in glycerin is in the author's opinion irrational. Carbolic acid in glycerin or in oil has a very weak antiseptic action. The watery solution works more energetically; to prevent maceration of the epithelium a 0.8% salt solution is added.

If the abortive treatment fails, an early vertical paracentesis in the posterior segment of the drumhead is made. Before the operation the auricle and external meatus are to be washed with a lukewarm 1:1000 sublimate solution, and a little of a 10% cocain solution in 1% carbolic acid solution dropped in the ear. After the paracentesis, and whether exudation occurs or not, neither washing or other irritating operation is done, because if exudation is present it will shortly find its way out, and if none be present the artificial perforation will close in twenty-four hours without complicating matters. If the perforation does not appear to be large enough a second incision is made which crosses the lower end of the first at right angles. The pain is much lessened by the use of cocain. While exudation takes place the perforation is to be kept open and all washings are to be avoided. To prevent the too early closure of the perforation drainage is to be secured thus: After perforation the secretion and blood in the meatus are carefully removed by means of a tampon so used that the drumhead is not touched. Only when the secretion is very great is a lukewarm 1:10,000 sublimate solution gently used. Then with a forceps under aseptic precautions and using the eye and speculum, a thin strip of iodoform gauze is deeply inserted in the external canal, the end of the gauze is, however, not allowed to touch the drumhead which it would irritate. The correct insertion of the tampon is of great importance, since if too deeply inserted it cannot be borne, and if not inserted far enough it will not prevent the pus collection in the deeper part of the meatus. The strip of gauze makes possible capillary drainage. At the outer end a few layers of

iodoform gauze are placed, and if the secretion is very abundant, absorbent cotton and gauze may be applied and a bandage put on. If necessary the dressing may be applied twice a day. Sometimes the absorbent cotton may be attached to the auricle with collodion. When after two or three weeks the acute symptoms have disappeared but pus is still present, an ear bath, lasting fifteen to twenty minutes, of a 1:10,000 sublimate solution should precede the dressing—of course a large opening in the drumhead must exist. The air douche was very rarely used and Gradenigo believed that it not infrequently caused a recurrence of the acute symptoms especially in children.

Fifteen case histories are given by way of illustration.

TRANSPARENT MACROSCOPIC PREPARATIONS OF THE ENTIRE ORGAN OF HEARING.

Katz, (*Berliner Klin. Wochenschr.*, 1895, No. 1). Katz's method is a modification of one published by him in the *Archiv. f. Ohrenheilk.* XXXIV, by means of which transparent sections of the temporal bone, including the soft parts, nerves, blood vessels, etc., can be prepared.

Osmic acid is introduced to the nervous apparatus either by the oval window or through an opening made in a semicircular canal. The bone is then placed in a 1/4% chromic acid solution, to which has been added 10 ccm. of a 1% osmic acid solution for four to six weeks. Then successively in 20% (saltpetre säure) for decalcifying, and 90% alcohol. Then with a razor the part selected is cut out and placed first in absolute alcohol and then in xylol. The object is transparent in twenty-four hours and is mounted in balsam in glass cells. The cell wall is plane so that the object may be magnified.

THE STAPHYLOCOCCI AND OTORRHEA.

Lermoyez and Helme, (*Annales des mal. de l'oreille*, etc. Jan., 1895).

1. Acute otitis media is often mono-microbic at the onset; the pus collected at the moment of paracentesis as a rule contains but a single pathogenic species.

2. The streptococcus and the pneumo-coccus are those commonly found; the staphylococci are rarely seen at this time and almost always associated with other forms.

3. At the end of a variable time a secondary infection occurs and gradually displaces the primary one.

4. This secondary infection is due to the staphylococcus, especially *s. albus*. This micro-organism was met with in ninety-two out of one hundred cases of otorrhœa of long standing, and almost always isolated.

5. It determines the passage from the acute to the chronic otitis media, and the constant influx of staphylococci maintains this chronicity.

6. They may enter by the Eustachian tube but their more probable course is from the external meatus through the perforations in the drumhead.

7. They are found in the cerumen, and may, therefore, exist in the canal before the disease develops.

8. They are commonly introduced on dressings which have not been sterilized, especially on absorbent cotton.

9. The authors have been able to demonstrate almost invariably the staphylococcus albus on the tampons, etc., of cotton. The habit of rolling with the fingers the cotton which is inserted into the meatus is the usual method of producing the secondary injection.

10. The surest way of preventing chronicity is to observe the strictest antiseptic and aseptic precautions.

11. These comprise three points: asepsis of nose, naso-pharynx and mouth, asepsis of the auditory canal, asepsis of instruments and dressings, especially of the absorbent cotton. These tampons may be sterilized and prepared in advance, but

12. The authors have devised a new and simple method for the sterilization of cotton—a spirit lamp and a bottle of a saturated solution of boric acid in alcohol. This method is based upon the properties of boric acid as an ignifuge. It consists in soaking the armed cotton carrier in the boric-alcohol and holding it in the flame for five seconds. It is sterilized in a few seconds without being changed in any way and without losing its absorbent quality.

OPERATIONS ON THE MASTOID APOPHYSIS.

Broca, (*Annales des mal de l'oreille*, etc., Jan., 1895). Broca describes the three methods of operation practiced by him: 1. Trepanation of the apophysis. 2. Trepanation of apophysis and tympanic cavity. 3. The operation of Stacke, which he is particular to exactly describe and differentiate from (2).

A good deal of attention is devoted to a condemnation of Wilde's incision from which fact one might conclude that it is done, more frequently than is right, in France as in some countries nearer home.

In detailing the indications for the various operations Broca mentions that he only rarely opens mastoid and middle ear in acute cases, but considers it the operation to be chosen in chronic cases. While Stacke's operation is indicated in rebellious suppurations of the attic, Broca agrees with the majority of aural surgeons that cases in which the simple Stacke operation is sufficient, are exceptional.

The ninety-nine briefly told case histories are arranged under five heads:

1. Non-suppurative, eburnating, painful osteitis.
2. Acute suppurative otitis, complicated with mastoiditis.
3. Chronic suppurative otitis, with mastoid abscess or fistula.
4. Suppurations of attic, without clinically appreciable mastoid lesion.
5. Foreign bodies in the tympanic cavity.

EXTENSIVE PERFORATIONS OF THE BONY
SEPTUM.¹BY D. BRYSON DELAVAN, M. D.,
OF NEW YORK.PROFESSOR OF LARYNGOLOGY AND RHINOLOGY NEW YORK POLYCLINIC;
CONSULTING LARYNGOLOGIST TO THE NEW YORK CANCER HOSPITAL.

PERFORATIONS of the nasal septum, situated near the posterior edge of the cartilage of the septum, and of not too great a size, are seldom of any serious pathological importance. There is a class of perforations, however, which up to the present time, have been allowed to pass almost unnoticed, but which in the opinion of the writer is deserving of attention. I refer to the more or less extensive injuries sometimes made in the course of operations upon the septum and involving a loss of substance in the vomer. Such an accident is apt to occur from the attempted removal by means of the saw of what appears to be a septal spur or ridge, but which, in reality, is a sharp horizontal deflection of an unusually thin septum. Instead of a ridge being removed, a long narrow opening, parallel with the floor of the nose, is made between the two nasal cavities. In several cases which have come under the observation of the writer in which this accident has occurred, the patient has suffered marked symptoms of general shock, quite out of proportion to the apparent importance of the injury. In one case at least there occurred reflex phenomena of such unusual interest as to warrant their being placed on record:

R. D. W., during boyhood, suffered a severe fracture of the nose, as a result of which one nasal cavity was entirely occluded by a long, almost horizontal ridge, the latter being caused by a sharp bending upon itself of the posterior part of the septal cartilage and the anterior half of the vomer. In removing this ridge an opening was made, chiefly through the vomer, about three-quarters of an inch in length and three-eighths of an inch in its

¹Read before the Laryngological Section of the New York Academy of Medicine, November 28, 1894.

perpendicular diameter. Within twenty-four hours after the operation marked mydriasis of the right eye appeared. Twelve days later, the mydriasis having continued, the patient was seen by Dr. Richard H. Derby who found complete paralysis of accommodation of the right eye, the pupil of which was dilated *ad maximum*. Patient made slow improvement under treatment, and it was several months before the normal condition of the eye was completely re-established.

The above case, with one other, are the only instances in which, to my knowledge, I have ever unintentionally perforated the septum. Both patients were men of spare build and nervous temperament. In the second case no localized reflex phenomena presented themselves, but the patient suffered unduly from shock, and believed himself to have been distinctly injured by the operation. I have seen three cases operated upon by others, in which similar injuries have been followed by severe and long-continued nervous irritation.

Theoretically speaking there is very little of anatomical importance in this part of the septum, except the nerve-supply. The lower artery of the septum by which this region is supplied is not likely to be injured in any of its large branches, and the loss of some of these should be readily made up for by other neighboring vessels. With the nerves, however, the case is different, for this location is precisely in the track of the fibers of the naso-palatine nerves, and even in the eye, although the connection of the latter organ with Meckel's ganglion through the medium of the few delicate filaments which constitute the ascending branches is apparently not very intimate, the possibility of reflex phenomena may be understood. The fact remains, moreover, that perforating injury to the septum in this region, in my experience, has sometimes been followed by severe disturbance.

THE APPLICATION OF THE GALVANO-CAUTERY
IN THE NASAL PASSAGES.By J. W. GLEITSMANN, M. D.,
OF NEW YORK.PROFESSOR OF LARYNGOLOGY AND RHINOLOGY AT THE NEW YORK POLY-
CLINIC, LARYNGOLOGIST TO THE GERMAN HOSPITAL
AND DISPENSARY, ETC.

IN this communication the writer proposes to speak of two methods only of applying the galvano-cautery in the nasal passages, viz., the galvano-cautery snare and the galvano-caustic destruction of inferior turbinated hypertrophy.

P. Heymann said, in the July number of the *Berliner Telinik*, 1893, that the use of the galvano-cautery snare had constantly decreased in the last few years, and that most operators now preferred the cold snare—an assertion with which the writer cannot agree. The advantages of the galvano-cautery snare, first recommended by Voltolini for operation of nasal polypi,¹ are the thorough severance of the tissue grasped, the avoidance of bleeding and the simultaneous cauterization of the remaining stump. Heymann maintains, that although considerable force might be necessary sometimes, he can always cut through dense tissue with a fine, cold wire, moreover some cases of bleeding have been observed after use of the hot snare, and he objects to the latter, as the eschar formed obstructs the field of vision and hides the smaller growths when present.

The first objection is not valid, as the hot snare cuts easier through the tissue than the cold one, and the observation of an eschar interfering with completing the operation has never occurred in the writer's practice, extending over a large number of cases. But the chief advantage of the galvano-cautery snare is the absence of the small amount of bleeding during removal of polypi. The few exceptions quoted by Heymann do not speak

¹ Voltolini. *Die Anwendung der Galvano-caustile*, second edition, Vienna, 1872, W. Braumueller, p. 242.

against a method, which as a rule not only saves the patient loss of blood, but by which also for this very reason the operation can be performed quicker and more completely, than when we have to tampon the nose and to wait till the bleeding has ceased.

For removal of nasal polypi and in fact for all operations requiring the employment of a snare the writer has for years past discarded the platinum wire and made use of a wire made of an alloy of platinum and iridium. It was originally devised for removal of posterior inferior turbinate hypertrophies,² for which it has always proved an invaluable acquisition in the writer's hand, as it not only reduces the time of the operation to a few minutes, but accomplishes the desired result with scarcely any loss of blood, if the current is occasionally interrupted before complete severance. The iridium being very brittle, imparts elasticity and resiliency to the wire, preventing its bending, and allowing it to resume its given curve when released, as *e. g.* in the rhinopharynx. The percentage of iridium in this alloy necessarily being small, it required several years experimenting to obtain a suitable wire. After trying several factories and also wire imported from Paris, where it is being made since 1890, a percentage of from 5 to 10 per cent has been determined upon as the proper kind, although if desired, a wire of higher percentage (20%) can be obtained. Wire of 27 American standard gauge has been found most serviceable, and its low price—45 cents net per linear foot furnished by Tiemann & Co., of this city—puts it within the reach of all operators who wish to test its merits. Iridio-platinum wire is already used by a number of operators, amongst them Dr. R. P. Lincoln, who recently removed with it a large naso-pharyngeal tumor.³

Three years ago the writer advocated in these ANNALS the use of trichloroacetic acid after galvano-cautery application to the nose,⁴ as a means of lessening the subsequent reaction. This method was severely criticized soon after its publication, making a reply almost imperative. A circular letter was addressed to forty-seven prominent rhinologists, asking their experience as to the after effect of the galvano-cautery, to which the majority very kindly replied. Circumstances beyond the control of the writer prevented the compilation of these replies at the time, and it is doubtful if the views expressed, dating about three years back,

² *Medical Record*, March 17, 1888, p. 315.

³ *New York Medical Journal*, May 26, 1894, p. 653.

⁴ ANNALS OF OPHTHALMOLOGY AND OTOTOLOGY, January, 1892.

would give the opinion of the contributors held now correctly. But it may be briefly stated that a great difference of opinion was revealed. A few did not use the galvano-cautery, a number of others always cauterized a small area only, the majority employed after treatment, some sprays, some the dry plan, strongly abrogating the spray, a few plugged the nose with different material. The larger number had reaction of milder or severer type, two had already used trichloroacetic acid and with satisfaction.

The publication of these reports and the deductions therefrom having once been deferred, it was deemed best to leave it to time to decide the usefulness of the method. Soon favorable communications were received in print as well as were made verbally to the writer, a few of which will be quoted here. The first approval appeared in remarks made during the discussion of a paper read by Dr. De Blois before the American Laryngological Association, June, 1892, when two members spoke very highly of the use of the acid,⁵ one stating that: "The results have been excellent, it lessens the inflammatory reaction and promotes healing of the parts." A similar opinion expressed by Dr. Würdemann⁶ saying: "The resulting eschar is firmly adherent and dry, and as a rule there is no reaction." The same author reiterated and emphasized this statement later on, and wrote:⁷ "In some thousands of applications I have yet to learn of reactive inflammation or erysipelas following its use. * * * In several instances where I have neglected its use I have had reactive inflammation; * * * but have always had uniform rapid healing where it has been applied." Equally satisfactory views and results, based on wide experience, are given by Dr. Stein, of Moscow,⁸ and the well-known European laryngologist, Prof. Moritz Schmidt, in his latest treatise on diseases of the upper air passages.⁹ The latter recommends the use of a weak borococain spray after the cauterization, which the writer has adopted since and has found to be very beneficial to the patient.

The writer has not felt called upon to modify his method published three years ago, except in some minor details. Although the percentage of unpleasant reactions is insignificantly small and grows smaller every year; occasionally cases do occur in which

⁵ Transactions of the American Laryngological Association, 1892, p. 97.

⁶ ANNALS OF OPHTHALMOLOGY AND OTOTOLOGY, July, 1892, p. 190.

⁷ *Journal of American Medical Asso.*, May 25, 1894, p. 740.

⁸ *Monatsschrift für Ohrenheilkunde*, January, 1894, p. 4.

⁹ Berlin, Julius Springer, 1894, p. 190.

swelling of, or discharge from, the cauterized wound is observed. The endeavor to find the underlying cause for the exceptions led to investigations in different directions, *e. g.* as to the constitution, temperament of the patient, plethoric condition, local hyperemia, density and degree of the hypertrophied tissues, but so far without any positive result. But one etiological factor has been found, which, when present, favors reaction in the majority of cases, *viz.*, bleeding produced by the galvano-cautery application. The reason probably is that the blood oozing from the cautery wound liquifies and washes away the trichloracetic acid and prevents the promotion of a dry eschar. Although the writer is strenuously opposed to such frequent cautery applications as he has seen made, six to eight times to one turbinated, and although he always tries to accomplish the necessary reduction with one operation, the cautery applications were made with greater care and precaution when there was any reason to expect bleeding. The borococain spray—1 to 500 to 1000—has, as stated before, materially assisted the desired result.

46 East Twenty-fifth Street.

A CASE OF FIBROMA OF THE NASAL FOSSA.¹

BY CHARLES H. KNIGHT, M. D.,
OF NEW YORK.

TUMORS of the nasal fossa made up in part of fibrous tissue are not uncommon, many cases of fibro-sarcoma and of fibro-myxoma being on record. Fibromata of the naso-pharynx are much more frequent. The explanation of this fact, generally accepted, is that the deep layer of fibrous tissue is denser and more plentiful at the upper and posterior parts of the nasal chambers and in the vault of the pharynx, than elsewhere in the upper air tract.

In a paper read at the Ninth International Medical Congress in 1887, Casselberry tabulated eight cases of intra-nasal tumor, in three of which, including one of his own, the diagnosis of fibroma was verified by the microscope. One was a fibro-sarcoma, one a fibro-myxoma, and the remaining three were designated fibromata, although no microscopic examination was made. In one of these last death resulted from hemorrhage following an attempt at removal of the tumor, a fact which would tend to throw suspicion on the diagnosis.

By many observers, vascularity is said to be a characteristic of a fibroma and epistaxis is mentioned as an early and constant clinical sign. A careful study of Bosworth's collection of forty-one cases of so-called fibroma would justify the exclusion of a large proportion of them. Hemorrhage, as a frequent occurrence, or in excess, is always suggestive of malignancy. Whatever may be the rule as to the naso-pharynx it is believed that pure fibromata of the nasal fossa, especially if pedunculated, are not dangerously vascular growths.

Since the date of this report a single case of fibroma has been recorded, that exhibited by Gerber, January 8, 1894, and referred to in the *Journal of Laryngology*, April, 1894. In 1893 Stoker gave the history of a case of what he calls "soft fibromata," vascular papillary growths of the middle and inferior turbinated bodies, evidently not genuine fibrous tumors. A similar case of "soft fibroma," of the nasal septum has been reported by Victor

¹ Read before the Section in Laryngology of the New York Academy of Medicine.

Lange, and is abstracted in the *Journal of Laryngology*, February, 1894.

The history of my own case is as follows: G. T. D., 21 years of age, came to me in 1889 with the usual symptoms of nasal catarrh which had been present for several years. The left nostril in particular was obstructed. There was no pain. The sense of smell was not impaired. There had never been any hemorrhage. The general health was excellent, except for a persistent cough with moderate expectoration which led the patient to apprehend pulmonary disease. The lungs, however, were sound. On anterior rhinoscopy the septum was seen to be somewhat deflected to the left, and far back in the left nasal fossa could be detected a smooth, movable tumor attached to the posterior end of the middle turbinated body. In the rhinoscopic mirror the tumor appeared nearly to fill the left choana. It was smooth, round and symmetrical, and decidedly darker in color than the average edematous polyp, and, moreover, was evidently denser in structure. Nevertheless, it was thought to be an ordinary gelatinous growth containing an unusual proportion of fibrous tissue.

The removal of the tumor was easily accomplished under cocain, by means of the cold wire snare, and was followed, of course, by great relief as regards the breathing, and by considerable improvement in the general catarrhal symptoms. The after-treatment consisted in the use of sprays, cleansing and sedative in character, and the reduction of turbinated hypertrophies with the galvano-cautery. There has been no recurrence of the growth.

The chief interest of this case centers in the microscopic character of the tumor which is a *pure fibroma*. Several sections have been examined by my friend Dr. Jonathan Wright, who reports that he has been unable to find the slightest trace of so-called myxomatous structure. I am able to show only a remnant of the neoplasm which, however, gives an idea of its dimensions. The micro-photograph exhibits the density and absence of vascularity in the growth, and shows near the surface at certain points, collections of small round cells suggestive of sarcoma. In general the fibrous structure is perfectly distinct, and becomes more marked towards the middle of the tumor.

Since the presentation of this report a case of nasal fibroma has been published in the *Charlotte Medical Journal*, January, 1895, by Dr. W. H. Wakefield. It does not appear that the diagnosis was confirmed by the microscope, and the precise implantation of the tumor remains in some doubt, its point of attachment not having been determined before its removal.

A FEW MODIFICATIONS IN THE OPERATING PROCESS OF ADENOID TUMORS.

By A. A. FOUCHER, M. D.

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THE question of adenoid tumors, is no novel one in the domain of medical literature. There is, nevertheless, it seems, in the same field, ample scope for a more minute exploration, if not on the ground of their diagnosis, prognosis, and pathological anatomy, at least on that of their treatment.

We will enter upon the subject immediately, and state that any process of operation tending to diminish the danger, the length of the operation, and secure the total removal of the adenoid growths in one sitting; in short, to reduce to its lowest terms both for the patient and the doctor, all that the operation demands, requires consideration. Such is the result obtained, we believe, by using

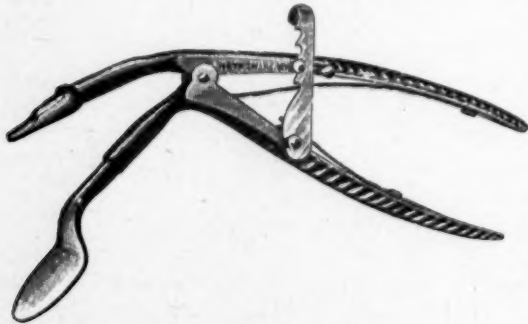


FIG. 1.

a combined mouth-gag and tongue depressor of a new model, (Fig. 1) and by modifying Higguet-Munger's curette as represented in Fig. 2.

The tongue depressor and mouth-gag we present, furnishes simultaneously, the quickest and easiest way to obtain both the desired opening of the mouth and the depression of the tongue. To seek the same end with two distinct instruments implies a loss of time and an unnecessary complication of the operation.

The tongue depressor, if made use of, alone renders one liable to several inconveniences; the patient only half opens his mouth, moves his tongue so that the instrument is displaced and sometimes even thrust out of the mouth, or moreover, as it has often happened to us, the patient completely closes his mouth as soon as the instrument has reached the posterior part of the velum palatinum. These difficulties cause at least a delay in the operation and by no means do they facilitate or enhance it for the doctor.

If beforehand, anything whatsoever be inserted between the teeth in order to secure an opening, no matter how small, the combined mouth-gag and tongue depressor can be introduced and



FIG. 2.

the mouth instantly opened, in fact, it is sooner done than said and the way is made clear for the operator.

If the jaws are closed, all that is required is a slight opening for the insertion of the thin blade of the tongue depressor which, as it works its way in, opens the mouth, the teeth gradually coming in contact with the part forming the gag.

The curette is modified, as to the shape of the annular knife and as to the direction to be given to the handle of the instrument.

The straight handle, metallic or otherwise, is defective because the hand cannot grasp it firmly enough; it slips, turns around according to its greater axis, and causes the operator to carry the edged ring where he does not intend.

We operated without anesthesia, (it being the express desire of the father), on a very unaccommodating patient, a boy, 16 years of

age, large and strong, who would not open his mouth. With the aid of two assistants and a straight jacket that kept the patient tied to the chair, he was mastered and placed in a proper position for the operation, but still the battle was not won.

The ceremony of the opening of the mouth was a signal for a desperate fight. The patient persisting in his obstinacy, force and dexterity had to be used and were finally crowned with success.

Unfortunately, during the struggle, a few decayed teeth were broken, and the patient now deprived of every apparent mode of defense resorted to the secretions of his salivary glands to quench his unabated rage. Instantly both operators and assistants were covered with spittle and struck with the debris of the broken teeth, which were the least unpleasant of the projectiles.

Notwithstanding this volley of a new description, Gottstein's curette was boldly thrust towards the pharynx. Meanwhile, the ordinary tongue depressor did not remain in place, and finally, as the curette was on the point of surmounting the contraction of the velum palatinum and that the long desired and dearly fought for object was to be attained, another difficulty presented itself; the handle of the instrument was so covered with blood and saliva that it was impossible to keep hold of it and to manipulate it in a proper way.

The operation, however, was brought to an end. It was rather incomplete than otherwise, and it is useless to add that the patient did not give us a second chance to judge its results.

There is no doubt that the experience just related has occurred elsewhere also, for modifications were evidently made in the shape of the handle of the curette, in order to furnish the hand with a better grasp.

Nevertheless any such modifications heretofore introduced seem inadequate and remain inferior to that we present, a modification that has stood the test of two year's experience and given entire satisfaction.

As can be seen by the accompanying illustration our instrument is bent at right angle, the handle rests entirely in the hand when closed, the thumb being placed at the end of the branch that bears the ring, prevents any lateral movement and helps to direct the instrument according to will.

Another important improvement we thought fit to make in Higuet-Munger's curette, has been the suppression of its projecting acute inside part, which has the grave inconvenience of penetrating into the mucous membrane, and tearing it to a great extent.

The notch in the curette seemingly offers the advantage of setting the instrument towards the fornix of the pharynx, using the free margin of the post-nasal partition as a guide.

The few modifications just alluded to, have been attended, in our practice, with success, in the rapid, easy and efficacious treatment of adenoid tumors.

SEMIFLUID PREPARATIONS FOR NASAL USE.

BY WALTER F. CHAPPELL, M. D.,
OF NEW YORK.

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A SYSTEM of routine treatment is apt to be employed in affections which are more or less chronic in character; and especially is this true in diseases of the nasal cavity which are accompanied by either an hypertrophic or atrophic condition of the mucous membrane.

The application of medicines by the douche and spray has been a favorite routine method of treatment in nasal affections and they have met most of the indications. The necessarily fluid character of these solutions has diminished their usefulness to some extent, as they remain in contact with the mucous linings such a short period that the fullest benefits of the application cannot be realized.

When, therefore, a more or less constant application of a remedy is required, we must look for solutions which are very tenacious in character. The ointments and oils of the pharmacopeia can scarcely be utilized for this purpose, as one is too thin and the other too thick to be used with advantage.

During the past two years I have used in private and hospital practice a combination of zinc ointment and sterilized castor oil with hydro-carbon oil in the proportion of from half a drachm to two drachms of the zinc and castor oil to one ounce of hydro-carbon oil. This combination is called at the Manhattan Hospital oleum hydro-carbon compound, and is kept in stock solution as a base to which other remedies can be added as the nature of the case may indicate.

The solution has a white creamy appearance and is very tenacious. When applied to mucous surfaces it clings for several days to the openings of the mucous glands, and to any abrasions or spots of ulceration which may be present

In deciding what drug should be added to the stock solution, the nature of the affection must be considered. If it is acute in character, with considerable discharge, astringents or sedatives are indicated. If the affection is chronic the selection will depend on the presence or absence of nasal discharge. Much latitude must be allowed for individual preference in choosing remedies. In the primary stages of acute rhinitis, the writer has found the following prescriptions of great benefit:

R

Acidi tannici	gr. v.
Acidi borici	gr. x.
Cocain hydrochlor.	gr. i.
Olei hydrocarb. co.	℥i.

M. Sig.—Warm and use in the nostrils every four hours.

R

Camphoræ	
Mentholi aa	gr. v.
M.—Rub together, et adde	
Olei hydrocarb. co.	℥i.

M. Sig.—Use every four hours.

Either of these prescriptions will lessen the profuse irritating nasal discharge, and diminish the hypersensitive condition of the mucous membrane in a marked degree. In cases of hypertrophic rhinitis the treatment will depend on the form of the disease. If the hypertrophy is accompanied by considerable thick yellow discharge, tannic acid, five to fifteen grains to the ounce of the stock solution proves very satisfactory. If the discharge is watery, boric acid should take the place of tannic acid, if there is no secretion, and the membrane is puffed up and red, a soothing application such as liquor plumbi subacetatis is indicated.

Cases of atrophic rhinitis improve very much when treated by the application to the membrane of compound hydrocarbon oil with the addition of iodine crystals (four grains to the ounce) or one of the mercury ointments. The daily application of these oily solutions prevents the formation of dry crusts, and the stimulating properties of the iodine and mercury have a marked effect on any remaining glandular tissue. A preparation containing boric and carbolic acid makes an excellent dressing after operations on the septum, or after the use of the cautery or any caustic to the turbinated bodies. It keeps the parts clean and assists cicatrization.

Epistaxis, due to small cracks, abrasions or ulcerations, is relieved promptly if the oily preparations are used. The treatment should

be started between the attacks as it prevents the formation of crusts, the efforts to remove which frequently start a nose bleed.

The application of semifluid preparations causes so little discomfort that patients readily continue the treatment as long as required. For the same reason they are of special value in the nasal affections of children. These solutions may be painted over the interior of the nasal fossæ with a camel's hair brush or injected with a soft rubber syringe or dropper. They may also be poured from the tip of a small teaspoon into either nostril. If the head is tilted backwards, holding one nostril and taking a deep inspiration through the other, distributes the fluid pretty evenly over the interior of the nasal cavity. About ten drops is sufficient for each nostril, but if we wish to reach the posterior pharyngeal wall, or larynx, a larger quantity will be necessary. The application should then be made just before going to bed; it flows slowly backward during the night, and in the morning may still be seen adhering to the mucous membrane of the naso-pharynx, pharynx and larynx.

22 East Forty-Second Street.

FOREIGN BODIES IN THE EAR AND NOSE.

By M. D. LEDERMAN, M. D.,
OF NEW YORK.

LECTURER ON DISEASES OF THE NOSE AND THROAT, NEW YORK POLY-
CLINIC; ATTENDING AURAL SURGEON TO THE UNIVERSITY
MEDICAL COLLEGE DISPENSARY; ASSISTANT
SURGEON TO THE MANHATTAN
EYE AND EAR HOSPITAL.

WHEN we consider the frequency with which children are permitted to entertain themselves with whatever object may come within their reach, it is but natural that these accidents should be peculiar to child life. Yet among a series of cases herewith reported, three similar instances (two of which were involuntary) occurred in adults.

As the nostril and external openings of the auditory canals are the most accessible hiding places for such substances, they consequently become the repositories of anything not too voluminous. It is, therefore, not surprising to find almost any diminutive article in these cavities. Usually the introduction of a foreign element is brought to the attention of the parent by the restlessness of the young one, or by obvious symptoms referable to the seat of the trouble. If such proves to be the case, the family physician is consulted, and often his dexterity permits the successful extraction of the missing body. At times, however, the absence of necessary instruments prompts him to refer the patient to the specialist. Not infrequently, repeated attempts at the removal of the article are made before the case comes under our care, and the resulting tumefaction makes the procedure a difficult and painful matter. Occasionally the parents do not know that their child has introduced a foreign substance into the nose or ear, and they become enlightened only after same has been discovered and extracted. Simple means usually suffice, but there are a few cases of "foreign body in the ear" reported where a major operation had to be performed (separation of the auricle from its attachment and reflected anteriorly), before the extraneous matter could be

withdrawn. Bearing in mind the unpleasant sequela which may result from faulty manipulation in trying to effect the desired result, we should bring to our aid the method which admits of such an action with the minimum degree of traumatism.

In a case which I published last year,¹ symptoms had existed for three months without the mother being aware of the origin of the little girl's affection. Incessant scratching of the nose was observed by the parent, but she thought that this habit diagnosed "worms." Unilateral nasal discharge with an eczema of the upper lip were pronounced symptoms. The family physician treated the condition as purulent rhinitis until a suppurative otitis ensued, when the case was referred to me. Recalling the frequency with which an excessive one-sided nasal secretion in children is associated with foreign body, an inspection of the nares followed, and some obstruction could be detected in the left middle meatus. Could not, however, appreciate the nature of the substance. Syringing through the unobstructed side with head bent forwards, succeeded in releasing an impacted coffee bean. The mother then remembered that her young daughter was in the habit of playing with these beans. Two days after the expulsion of the exciting cause, the aural discharge ceased, demonstrating the deleterious influence pathological changes in the nasal chambers exert upon adjacent structures.

Case I. S. B., 5 years of age, mother stated that the boy had a "bloody flow" from the left side of his nose for about five weeks. She noticed that the outside of the nose was considerably swollen, and when the part was touched the child cried bitterly. He was very restless at night and constantly rubbed his nose. Some one had told her that the boy had catarrh. An examination found upper lip and wing of nose excoriated, with a collection of purulent secretions occupying the left cavity. After cleansing the latter, a shoe button was discovered, with the eyelet pointing anteriorly, situated about three-quarters of an inch from the external orifice, between the septum and inferior turbinated body. This was readily removed by means of a small double tenaculum angular forceps, which nicely grasped the presenting eyelet. The offensive discharge stopped a few days later, under a mild antiseptic spray.

Case II. H. S., 4 years of age, male, was brought to my office on account of a continuous "yellowish discharge" from the right nostril. Mother was not aware of any foreign body having been put into the nose by the little patient. The "running of the nose" had existed for about three weeks before she consulted me.

¹Suppuration of the middle ear, etc., *Med. Record*, April 14, 1894.

No signs of pain were observed, but as in the other instances, the finger was frequently introduced into the nostril. Inspection revealed occlusion of the right nasal chamber by a mass of mucus. Removing same by means of a cotton wrapped applicator, a piece of "sugar string" was found to be the source of irritation. It was conveniently grasped with the knee-forceps, and measured about four inches. The boy had evidently pushed this plaything into his nose, and was not able to get it out. Three days later the nose was in its normal condition.

We occasionally meet with similar accidents, in which prolonged and futile attempts at extraction generate considerable congestion and swelling of the nasal mucous membrane and erectile tissue. In these cases, a spray or application of cocaine solution will materially assist in simplifying matters, by its anesthetic and contracting properties. In the auditory meatus, however, cocaine has but little effect in reducing the tumefaction, and consequently if the substance has become impacted it is advisable to give a general anesthetic. Usually a few whiffs of chloroform will answer the purpose. We rarely meet with such complications in the adult, as they quickly seek professional assistance, if such an accident should happen. Even though the foreign article is not surrounded by swelling of the soft parts, it is judicious to administer an anesthetic to restless children, to avoid the liability of causing further traumatism.

Case III. H. E., male, 20 years of age, consulted me on account of a peculiar noise in his left ear, which came on suddenly during the morning of his visit, as he arose. Never had any difficulty with his ear before, and was much annoyed at the strange symptom. He had taken no medicine for a long period, and was feeling in the best of health. The tinnitus was intense at times, but then ceased abruptly. Hearing was excellent. On examining the left ear, I noticed a small black spot about the size of a pin's head, just below the umbo. On attempting to brush same aside with the cotton-wrapped applicator, this spot showed signs of animation, and traveled towards the anterior periphery of the membr. tymp. Immediately the patient remarked that the noise had again returned. As soon as the "bedbug" (for such the anomaly proved to be) was quiet the noise ceased. Douching with a carbolic solution failed to dislodge the intruder; but a pair of aural knee-forceps accomplished the purpose.

Case IV. Was much like case III, except that the diminutive specimen belonged to the cockroach family, and was found dead in the auditory canal of a woman, 45 years of age. There had been some tinnitus for a few days, but it had stopped suddenly, and patient came to one of my clinics to be treated for a fullness which existed in the ear. The corpse was removed with the ordinary ear forceps.

Case V. J. G., 21 years of age, presented herself at my clinic at the Manhattan Eye and Ear Hospital, stating that the night previous to her visit she had attended a theatrical performance during which there was a repeated discharge of firearms. Being of a nervous disposition she placed some silver foil (which had been wrapped around bonbons) into her ears, to avoid hearing the sudden explosions. At the end of the drama she succeeded in removing the obstruction from the right ear, but accidentally pushed the left one further into the canal, and could not reach it. Hearing was naturally lowered, but conversation was appreciated as usual. No tinnitus existed; the silver foil was easily rolled out of the meatus by means of a dull ring-curette.

Case VI. C. A., female, 3 years of age, came to the same institution with her mother, who informed me that there was a small bead in the little girl's right ear, as she had seen the child put it there. Examination substantiated the parent's statement, and the bead was withdrawn from its position against the memb. tym. with the aid of the dull ring-curette. Some myringitis was present, but this passed away in two days.

Case VII. Male, 4 years of age, was in the habit of playing with yellow corn. He swallowed a seed occasionally, for which action he received corporal punishment. This time he stuck a grain into his right ear, and the mother's ingenuity did not succeed in abstracting same. The corn was observed close to the Mt., the longest diameter being antero-posteriorly. No difficulty experienced in catching hold of same with a pair of mouse-toothed forceps.

Case VIII. J. H., 10 years of age, male, was playing with some of his friends around a pebble mound. In trying to see how far a pebble would go into his ear it became lodged in the right canal. Mother came to the Manhattan Eye and Ear Hospital with the boy, where I removed the stone under ether with the dull ring-curette. It was larger than a good-sized cherry stone.

Case IX. C. J., 12 years of age, male, was referred to the same clinic by the family physician. The boy had introduced a coffee bean into his right ear two days before his visit, and though the attending physician had repeatedly tried to extract it, the bean resisted his tactics. An inspection revealed the soft tissues of the canal greatly swollen and very painful. The source of the discomfort could be plainly seen jammed against the drum, which was obviously inflamed. As the pressure of the speculum was quite painful, ether was administered. At the previous attempts a piece of the bean had been broken off, and it was only after I had succeeded in crushing the remaining portion, which was imbedded in the lacerated structures, that same could be removed. Suppuration was anticipated and resulted, though antiseptic precautions had been observed. Under daily applications of hydrogen peroxid, this condition ended on the fifth day.

Among the numerous instruments suggested for the removal of foreign bodies from the ear and nose, the dull ring-curette, small mouse-toothed forceps and aural syringe are probably the most simple and useful. In the majority of aural cases the ring-curette will prove to be the instrument *par excellence*. We must consider the chemical properties of the object to be extracted, for syringing, though generally a harmless and excellent agent, may strikingly augment the existing difficulty if applied to bodies of a hygroscopic nature. Gentle maneuvering will frequently succeed, while heroic measures may not alone prove futile, but may give rise to undesirable consequences. If the foreign body happens to be a member of the animal kingdom, a little chloroform dropped into the canal may quickly end its existence, after which its removal is an easy matter.

128 East Sixth street.

THE USE OF LOCAL APPLICATIONS OF GUAIACOL
IN DISEASES OF THE THROAT.BY HAL FOSTER, M. D.,
OF KANSAS CITY, MO.

THE preparations of guaiacol have been used for sometime in pulmonary diseases, especially phthisis. There can be no question that this drug acts on the germs, reduces the temperature and proves a source of satisfaction to the physician by giving marked results. The carbonate has been used more extensively internally, given in capsules or in milk. During the last year many laryngologists have used the solution of guaiacol topically to acute affections of the throat with good results. For several months I have been using a solution of pure guaiacol, locally for acute tonsillitis. I have applied the solution of pure guaiacol by means of cotton on the ordinary throat applicator. As a rule, the drug causes a burning sensation for a few moments after being applied to the tonsils. I have also used it in ulcers of the larynx caused by tuberculosis; in each case it has acted well and has enabled my patients to swallow food without pain. In these cases of tuberculosis of the larynx the carbonate of guaiacol in capsules or milk has been used internally as well. In using the pure solution to the throat it is necessary to exercise great care in order that none of the drug should get into the larynx.

If the applicator armed with cotton is thoroughly saturated and gently touched against the mouth of the bottle before making the application to the throat there will be no danger of getting any of the drug into the larynx. It can be used in oil of almond as a spray in any strength the physician may elect. In my experience the direct applications to the throat have been much more satisfactory in every way. I have also used it with some satisfaction in acute pharyngitis. If the drug is used early before pus has formed in the tonsils many cases of tonsillitis can be aborted and much pain and discomfort spared the patient.

PROFESSIONAL NEWS.

AMERICAN MEDICAL ASSOCIATION,

SECTION ON OPHTHALMOLOGY,

MEETS IN BALTIMORE, MAY 7-10, 1895.

OFFICERS OF SECTION:

Edward Jackson, Philadelphia, Pa., Chairman.

H. V. Würdemann, Milwaukee, Wis., Secretary.

Executive Committee; J. L. Thompson, Indianapolis, Ind.; S. D. Risley, Philadelphia, Pa.; A. R. Baker, Cleveland, O.

The limits of time allotted are ten minutes for the reading of a paper, and five minutes for remarks in discussion.

The annual dinner of the Section will take place on Tuesday evening; (price, \$2). Those who expect to be present are requested to notify Dr. Hiram Woods, 816 Park avenue, Baltimore, Md.

The volume of Transactions of the Section will be forwarded to all who will send the Secretary \$1, with their address.

PROGRAM—TUESDAY, 3 P. M.

1. Address of Chairman. The strength of the different mydriatics and myotics. Edward Jackson, Philadelphia, Pa.

2. Incipient cataract. A. R. Baker, Cleveland, O.

3. Operative treatment of immature and some forms of zonular cataract. J. E. Weeks, New York. N. Y.

4. The operation for secondary cataract. J. H. Thompson, Kansas City.

Discussion to be opened by Boerne Bettman, Chicago, Ill.; J. A. White, Richmond, Va.; Geo. E. Frothingham, Detroit, Mich., and Herman Knapp, New York.

5. Practical points in anesthesia for plastic operations about the eye. M. W. Zimmerman, Philadelphia, Pa.

6. The restoration of the eyelids with sliding flaps. W. C. Tyree, Kansas City, Mo.

7. Blepharoplasty without pedicle. Eugene Smith, Detroit, Mich.

8. Transplantation of skin in plastic operations on the eyelids. Walter B. Johnson, Paterson, N. J.

9. Skin grafting in ectropium and entropium. F. C. Hotz, Chicago, Ill.

10. Transplantation of a strip of skin into the intermarginal space of the lids. Herman Knapp, New York, N. Y.

11. Some cases of restoration of eyelids by plastic operations, with exhibition of patients. Herbert Harlan, Baltimore, Md.

Discussion opened by R. A. Reeve, Toronto, Canada, and Swan M. Burnett, Washington, D. C.

TUESDAY, 7 P. M.

Annual dinner of the Section.

WEDNESDAY, 9 A. M.

12. A new and almost bloodless enucleation operation. Boerne Bettmann, Chicago, Ill.

13. Evisceration of the eyeball. L. Webster Fox, Philadelphia, Pa.

Discussion opened by S. D. Risley and G. O. Ring, of Philadelphia, Pa.

14. Histological and bacteriological notes on some cases of penetrating wounds of the eyeball, with experimental observations on certain bacilli found in a case of post-operative panophthalmitis. G. E. de Schweinitz, Philadelphia, Pa.

Discussion opened by R. E. Randolph, Baltimore, and H. Gifford, Omaha.

15. A clinical study of the ulcerative diseases of the cornea. S. D. Risley, Philadelphia, Pa.

Discussion opened by C. J. Kipp, Newark, N. J.

16. Hemorrhage into the retina and vitreous in young persons, associated with evident disease of the retinal blood vessels; remarks on the formation of vessels into the vitreous and in a case of emigrating subhyaloid hemorrhage. Harry Friedenwald, Baltimore, Md.

17. Prognostic significance of albuminuric retinitis. E. Oliver Belt, Washington, D. C.

18. Extensive colloid changes in the choroid, with report of cases. J. T. Carpenter, Jr., Philadelphia.

Discussion opened by G. E. de Schweinitz, Philadelphia, and R. W. Gillman, of Detroit, Mich.

WEDNESDAY, 3 P. M.

Report of Nominating Committee and election of officers.

19. Historical notes on operations on the ocular muscles. T. B. Schneideman, Philadelphia, Pa.

20. The technique of tenotomy of the ocular muscles. Leartus Connor, Detroit, Mich.

21. The slight effects sometimes produced as the result of free tenotomies of the ocular muscles for heterophoria. S. Theobald, Baltimore, Md.

22. The limitations of tenotomy of the ocular muscles. H. F. Hansell, Philadelphia, Pa.

23. Tendon advancement, with a special indication for its employment. C. H. Thomas, Philadelphia, Pa.

24. The indications for, advantages and technique of muscle shortening. G. C. Savage, Nashville, Tenn.

Discussion opened by Geo. T. Stevens, New York; J. L. Thompson, Indianapolis, and S. D. Risley, Philadelphia, Pa.

25. Strabismus. C. M. Hobby, Iowa City, Iowa.

26. To what extent should recently suggested methods of muscular exercise displace tenotomy in the treatment of heterophoria. Hiram Woods, Baltimore, Md.

27. Practical points gained in the treatment of 1,000 cases of insufficiency of ocular muscles. J. W. Park, Harrisburg, Pa.

28. Hysterical affections of the eye muscles. H. Gradle, Chicago, Ill.

29. Some remarks on paralysis of the superior rectus muscle. Ed. J. Bernstein, Baltimore, Md.

Discussion opened by J. F. Fulton, St. Paul, Minn., L. Connor, Detroit, Mich., and S. Theobald, Baltimore, Md.

THURSDAY, 9 A. M.

30. Report of committee on legislation for the prevention of blindness. Lucien Howe, Chairman, Buffalo, N. Y.

31. Some rare cases of infantile purulent conjunctivitis. A. A. Hubbell, Buffalo, N. Y.

Discussion opened by B. Alex. Randall, Philadelphia, Pa.

32. Retrobulbar tumor. S. C. Ayres, Cincinnati, O.

Discussion opened by J. A. White, Richmond, Va.

33. A case of enchondroma of the cartilage of the upper lid. P. D. Keyser, Philadelphia, Pa.

Discussion opened by F. C. Hotz, Chicago, Ill.

34. Report of a case of traumatic varix of the orbit in which ligation of the left common carotid was performed. C. A. Oliver, Philadelphia, Pa.

Discussion opened by R. A. Reeve, Toronto, Canada.

35. The infiltration method of anesthesia in ophthalmic practice with demonstrations. H. V. Würdemann, Milwaukee, Wis.

Discussion opened by Harry Friedenwald, Baltimore, Md., and Carl Koller, New York, N. Y.

THURSDAY, 3 P. M.

36. Report of committee on the examination and care of the eyes during school life. B. A. Randall, Chairman, Philadelphia; W. F. Southard, San Francisco; H. B. Young, Burlington, Ia.; A. R. Baker, Cleveland, and George H. Price, Nashville.

Discussion opened by Peter A. Callan, New York, James P. Parker, St. Louis, and S. D. Risley, Philadelphia.

37. Two thousand five hundred cases of ocular headache and the different states of refraction connected therewith. W. F. Mitendorf, New York.

38. A study of the refraction of 1,500 eyes. H. Bert Ellis, Los Angeles, Cal.

39. Anisometropia. W. F. Southard, San Francisco.

40. The percentage of symmetrical and asymmetrical meridians of the cornea in astigmatic eyes. S. D. Risley, Philadelphia, and J. Thorington, Philadelphia, Pa.

41. Latent astigmatism. H. M. Starkey, Chicago, Ill.
 42. On the general and local conditions that change corneal curvatures. L. J. Lautenbach, Philadelphia.
 Discussion to be opened by T. E. Murrell, St. Louis; W. H. Wilder, Chicago, and Edward Jackson, Philadelphia.

FRIDAY, 9 A. M.

43. Ectopia lentis. Flavel B. Tiffany, Kansas City, Mo.
 Discussion to be opened by Harold Gifford, Omaha, Neb.
 44. The use of prisms to increase vision in the formation of new maculae in conical and leucomatous cornea, etc. George M. Gould, Philadelphia, Pa.
 Discussion opened by T. H. Fenton, Philadelphia.
 45. Observation upon the eye of the negro with special reference to the refraction, ocular muscles and color vision. C. W. Kollock, Charleston, S. C.
 Discussion opened by Swan M. Burnett, Washington, D. C.
 46. Ophthalmoplegia interna. B. L. Milliken, Cleveland, O.
 Discussion opened by H. V. Würdemann, Milwaukee.
 47. The relation between the eye and the brain. J. A. Lydston, Chicago, Ill.
 Discussion opened by R. E. LeMond, Denver, Colo.
 48. Anomalies in ophthalmic practice. A. C. Corr, Carlinville, Ill.
 Discussion opened by S. L. Ziegler, Philadelphia.
 49. Formalin as a preservative agent for eye specimens. W. H. Wilder, Chicago, Ill.
 Discussion to be opened by F. C. Hotz, Chicago, Ill.
 50. A new keratometer. D. S. Reynolds, Louisville, Ky.
 Discussion to be opened by Geo. H. Price, Nashville, Tenn.

This is not the complete program, and we regret that we failed to receive the additions to it in time to have them inserted, but the above is sufficient to show that the Section of Ophthalmology is the live end of the American Medical Association. The Chairman and Secretary of the Section deserve much credit for their good work. We are informed that the program of the Laryngological and Otological Section—of which Dr. J. F. Fulton, of St. Paul, is President, and Dr. F. J. Gallaher, of Pittsburgh, is Secretary—will be better than has been presented in the history of the Association.

[Ed.]

Dr. M. D. Lederman, of New York City, has removed from 1029 Park avenue to 128 East Sixtieth Street.

Dr. Julius G. Ehrhardt, late Professor of Ophthalmology and Otology in the College of Physicians and Surgeons of St. Louis, Mo., has established a private hospital, at 1418 Washington avenue, for the care and treatment of patients afflicted with diseases of the Eye and Ear.

FOR SALE.

THE PRACTICE OF AN OCULIST, AURIST AND RHINOLOGIST.

This practice is located in one of the metropolitan cities of the Pacific Coast; population 100,000. Practice has existed seventeen years, and is worth \$5,000 per annum *as shown by actual receipts on books*. Is the best known and most paying practice of the kind in the State. Central location; elegant offices. Purchaser succeeds to railway and sanitarium positions, and if right man, to hospital and college positions. Name and address of physicians and patients for twelve years to whom notices will be sent. Will thoroughly introduce purchaser. Family reasons, unconnected with practice, for leaving. Will be sold for \$5,000 *cash*. Seller well known to profession. Address: "Pacific Coast," care Dr. Jas. P. Parker, Union Trust Building, St. Louis, Mo.

MISCELLANY.

SOME OF THE DIFFICULTIES OF AN OCULIST IN
A SMALL CITY.

To one practicing a specialty of the eye in a small city, more or less removed from the great medical centers, the opportunities of adding to his knowledge, in the special branch to which he confines his practice, are his patients, his medical literature, and an occasional visit to a large city. One of the greatest opportunities for the examining and treating a large number and variety of cases is the free clinic, which in a small city does not always exist. It is of these difficulties and some method of overcoming them that it is my intention to write in this paper.

A special practice in a small city, very hard to get at best, can only be obtained in sufficient quantity to give one a living by drawing from the outlying community. The coming from time to time, of traveling quacks and opticians, the latter of whom obtain fabulous prices for glasses, and the former of whom advertise to such an extent that everybody who reads must know of their existence, tends to make practice all the more difficult, for with the generality of the people, there is still a prevailing idea that he who advertises most does the best work and has the best goods.

Therefore, it will be readily seen that even if a man practices in a small town he must be equally as well posted as his brother in the larger cities, for he is brought into competition not only with the honorable men of his own town and the general practitioner

who dabbles in eye work, but with an unscrupulous lot of wandering mechanics and quacks who, when they are gone, are found to have taken a large amount of money with them and left no means of redress.

In the first place, the visits to large cities. Should he perchance have a friend there who is practicing the same specialty, he goes at once to him for advice. If this friend has a large free clinic, it makes the way comparatively easy, provided his friend has the time and inclination to devote to him; otherwise he may sit for hours, and as far as treatment goes, hear nothing but collyria No. 1, 2 and 3, etc.; ointments i, ii or iii and mixtures a, b or c. Diagnosis he finds has not changed materially since he was a student, but treatment of which he is most in need, is as much a sealed book to him at the end of the clinic as it was at the beginning.

Undaunted by his first experience he turns to other channels for information. The regular medical schools are out of the question for their courses go through a whole year and when he has finished, the chances are he could, by buying the book of the man who has been lecturing or some standard work and carefully reading it, get the same information.

By carefully perusing the catalogues of the different colleges before leaving home, he has learned of such things as post-graduate schools, and to these he turns his steps. The first obstacle he meets with here are the fees. They are numerous and large and the courses extend over a space of several weeks, and if he is in luck he happens along just as one is commencing he may gain valuable information by closely following the different clinics and asking innumerable questions, but his opinion, when he has finished is, that these courses are money-making affairs, benefiting most those who give them, and his feelings will have received many a shock from contact with men who, by their manner and language, oftentimes endeavor to show him their superiority and his inferiority.

He, therefore, returns to his country home rather disgusted with his attempt. His next endeavor may be his attendance at a meeting of some large medical society. Here he finds assembled all the great lights of the country. If he is lucky enough to be a member of the Ophthalmological Society, he will have a very nice time, hear some splendid papers and many original opinions, but only a chosen few can join such a society, and as the membership is in the hands generally of one man, if he is rejected he has no

redress. A general medical society meeting with an ophthalmological section is now his best hope, but here he is again disappointed for the papers read are extremely scientific, and on very rare cases as a rule, while the simple matters and every day occurrences on which he most needs help and information are but lightly touched upon. The discussions are apt to become personal, are usurped by a few and amount to very little, but bringing a man before the public who is present at all such gatherings as a means, not of aiding his less brethren, but of ethical advertising.

The cases brought before the meeting are those of which a man has perhaps met one or two during his career, and although very interesting and instructive, are hardly what he wants.

Other papers are statistical, telling of one man's results in so many thousand cataract operations, or cases of refraction. This latter is of much benefit as I think all ophthalmologists will agree with me, that about 60 per cent of their practice is refraction.

He has a splendid time, meets many pleasant gentlemen and goes home refreshed and invigorated, fully determined to go again the next year to meet and renew the pleasant acquaintances and experiences of the previous one.

And now for his medical literature as a source of information and improvement. The great majority of writers in preparing an article for a journal, strive for one on some obscure subject or extremely rare case, thinking in all probability that from its rareness it will be read by more people and the reputation of the writer thereby increased. While it may be looked at and glanced through by a great many, it cannot possibly have the practical value to the practitioner in a small town, that a simple article on a less complex, less rarely seen, or less obtruse subject would have.

My opinion is that the number of scientific articles should not be diminished, but that the simpler diseases and remedies have more space devoted to them. The cases one sees every day are the ones in which we most desire information, while those that are seen but seldom are by their rarity almost sure of recognition.

Dubuque, Iowa.

J. W. HEUSTIS, M. D.

RECURRENT ULCERS OF THE CORNEA OF NASAL ORIGIN;
EPISCLERITIS; CURE.

WR., male, 27 years of age, telegraph operator, came to me on November 28, 1893, with a small central ulcer on cornea of left eye. He stated that he had had measles about four years before and had been troubled with ulcers on the cornea of one or both eyes most of the time since. For five months of the

past year he had been under the care of an oculist. Examination of naso-pharynx revealed white atrophic growths on posterior ends of the septum and extending back into the naso-pharyngeal space nearly, if not quite a half an inch. This latter swelling in its location, unlike anything I have ever seen, was almost completely obliterated by the contraction produced by an application of a solution of cocain. The ulcer of the cornea was lightly touched with liquid carbolic acid. A solution of sulphate of atropin was instilled into the eye and the patient instructed to bathe the eye freely with hot water. In one week the corneal ulcer healed.

On December 1, the galvano-cautery was applied to the growth on the lower right posterior turbinated body.

On December 5, the eyes showed no symptoms of irritation. On the following day I cauterized the growth on the posterior part of the lower turbinated body.

December 10, patient came to my office with a severe episcleritis of the right eye which had developed after the last application of the galvano-cautery. I instilled a solution of cocain into the eye and applied levigated calomel and ordered applications of hot water to the eye. The next day I applied the galvano-cautery to the growth on the posterior part of the septum.

December 18, the episcleritis was much worse. I cauterized the remaining thickening of the septum. I instilled solution of atropin into the right eye, applied calomel massage and instructed the patient to apply hot fomentations.

On January 1, the episcleritis had disappeared and the eyes were feeling well enough for him to go to the country where he remained a week, after which he returned to his work and has had no trouble with his eyes since. EDWARD J. BROWN, M. D.

Minneapolis, Minn.

SPONGE IN ORBIT AFTER ENUCLEATION OF EYE,

On March 1, 1895, Mr. J. W. A., a stonemason, of Kansas City, applied for an operation to render a socket capable of accommodating an artificial eye, and gave the following history:

About the last of September, 1876, was doing stone work on a building at Mountainhome, Arkansas, a chip of stone struck and destroyed his left eye. He applied to a physician who enucleated the injured eye and placed a sponge in the orbit which "became so tight that the doctor could not get it out the next day," and the patient went to Springfield, Mo. and applied to a physician who attempted to make an examination but the eyelids and side of face

were so swollen that the sponge was completely concealed and the patient experienced much pain when an effort was made to open the palpebral fissure, and the physician told him that it would be necessary to give chloroform in order to remove the sponge, but the ignorant sufferer refused to take chloroform and "went to a doctor who prescribed some medicine to pour on," and "in about two weeks the eye was well." Suppuration must have been very slight as the patient asserts that "no matter (pus) ever came from the eye." He returned to work at his trade three weeks after the injury, and has experienced no inconvenience or pain from it since. While operating for the relief of the symblepharon I made an incision with a Graefe knife into the stump and introduced a lachrymal probe and observed that the patient experienced no pain, though the point of the probe was one inch beyond the cocainized area. I was preparing to remove a portion of the stump for microscopic examination, when a young physician who was present observed my intentions and allowed his enthusiasm to get control of his talking organs, and the suspicious patient forbade "anything being taken away," and as he remarked he "was paying a good fee for the operation and had but little confidence in surgeons," and showed a disposition to be very unaccommodating, I did not insist upon securing the desired section. The sponge evidently prevented contraction of the orbital cavity and shrinking of the surrounding tissues. He is now wearing an artificial eye, the excursions of which are equal to those of the good eye, with which it moves conjointly, and it requires an expert to observe that the man has an artificial eye.

J. P. P.

BOOK NOTICES.

THE TOXIC AMBLYOPIAS; THEIR SYMPTOMS, VARIETIES, PATHOLOGY AND TREATMENT. By Casey A. Wood, C. M., M. D., Professor of Ophthalmology in the Chicago Post-Graduate Medical School; Ophthalmic Surgeon to Cook County Hospital, and to the Emergency Hospital of Chicago; Associate Editor of the ANNALS OF OPHTHALMOLOGY AND OTOTOLOGY, ETC.

This handsome book of about one hundred pages, substantially bound in cloth, is divided into seven chapters or parts, as follows:

1. Definitions and classifications.
- 2, 3. The etiology of toxic amblyopias.
4. The predisposing causes, symptoms, diagnosis and treatment.
5. A continuation of symptoms, diagnosis and treatment.

6. Agents of minor importance.

7. Pathology and treatment of the more important toxic amblyopias; prophylaxis and hygiene.

Many of our readers are already familiar with a large share of the contents of Dr. Wood's book on the "Toxic Amblyopias" as it appeared "piece meal" in the *ANNALS* during the years 1892, 1893 and 1894, and it was to satisfy the demand made by the readers of the *ANNALS* that Dr. Wood was induced to continue the laborious task of completing the work and having it bound in substantial book form. It is the most exhaustive work on the subject with which the editor of the *ANNALS* is familiar.

The labor and money expended in compiling the contents was greater than most of us could be induced to expend. The book will be a valuable addition to the physicians working library.

J. P. P.

AN OLD FRENCH OPHTHALMIC JOURNAL IN AMERICAN DRESS.

The *Annales d'Oculistique*, so familiar to many of our readers, is to hereafter appear in America. The January, 1895, number has already been translated and printed in the English language. The English edition is edited by Dr. George T. Stevens, 33 West Thirty-third street, New York, and published by the Transatlantic Publishing Company, 63 Fifth avenue, New York. It will appear in monthly numbers of 80 pages each. The annual subscription price of the English edition is \$5. It is certainly a welcome addition to the list of ophthalmic journals published in the United States, and with so accomplished an editor as Dr. Stevens we predict for it a prosperous and useful career.

J. P. P.

TRANSACTIONS OF THE SIXTEENTH ANNUAL MEETING OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION, held in the City of Washington, D. C., May 30, 31 and June 1, 1894. D. Appleton & Co., New York.

This volume of the transactions of the American Laryngological Association contains an unusually large number of valuable papers. In the annual address of the president, Dr. D. Bryson Delavan, attention is called to the history and early work of the association, and the struggles of the pioneer specialists in diseases of the throat from the time they groped blindly after truth up to the brilliant era when the laryngoscope was introduced (1860) by Manuel Garcia, and since the electric light and modern scientific methods. The history of the association is remarkable on account of the energy and talent of its founders and unceasing work of its present members. The association now has sixty "Active Fellows" and nineteen "Honorary" and "Corresponding Fellows."

J. P. P.

CHEMICALLY PURE HYPOPHOSPHITES. SYRUP OF HYDRIODIC ACID. THERAPEUTICAL INDICATIONS FOR USE, WITH CLINICAL DATA. Twelfth edition. Edited by R. W. Gardner, Pharmaceutical Chemist, 158 William street, New York.

Mr. Gardner has expended much time and study on the chemistry and therapeutics of the Iodides and Hypophosphites, which renders his book of real value to the medical profession. The entire book contains one hundred and ninety-four pages, seventy-six pages being devoted to the "Administration of Iodine," in the form of Syrup of Hydriodic Acid ("Iodide of Hydrogen"), and one hundred and eighteen pages to Chemically Pure Hypophosphites.

The Therapeutical Data has been compiled from the writings of some of the best known therapeutists of England, France, Germany, America, and other countries. As the author states in the Preface: "Text-books contain very little on the therapeutics of Hydriodic Acid," and his efforts have been appreciated, as evidenced by the writings of a long list of contributors to medical literature.

The limited space at our disposal prevents us from mentioning the names of the distinguished contributors or commenting upon the results of their clinical experiences with Syrups of Hydriodic Acid, and Chemically Pure Hypophosphites, but a perusal of the book will well repay the physician, in these days while "brilliant surgery" is allowed to so attract the medical mind from therapeutics.

J. P. P.

PEROXID OF HYDROGEN.

I have used Peroxid of Hydrogen quite extensively for cleansing discharging ears, the nasal and accessory cavities, and have tried all the brands of the preparation in the market, and once thought one manufacturer's make as good as that of another and bought the cheapest as a matter of economy, but recent experience has taught me that the difference in quality is greater than the difference in price. After an unpleasant experience with a solution of Peroxid of Hydrogen which severely injured the mucous membrane, I bought and examined, chemically, a bottle of each preparation of H_2O_2 in the market, and was surprised to find so much difference. Some are useless, and others worse than useless, because they contain too little available oxygen and too much free acids (phosphoric, sulphuric, hydrochloric). I now order Marchand's (medicinal) exclusively because I find it contains the desired quantity of available oxygen and not enough free acid to be objectionable, and its keeping properties are all that could be desired.

By inquiry I learn that Marchand's is the preparation that is used by almost all surgeons, and is considered, by them, the standard.

J. P. PARKER, Ph. G., M. D.

